Admin Guide for

Cyber Systems Overview

CONTROL DATA

REVISION RECORD

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CONTENTS

INTRODUCTION

This ESE individualized course administration guide is intended to provide you with information required to deliver the CYBER Systems Overview course.

Additional detailed administrative information and procedures can be found in the ESE Guide for the Delivery of Individualized Training and the ESE Course Specification Catalog.

SECTION 1

COURSE DESCRIPTION

PRODUCT NUMBER R0101

DESCRIPTION

CYBER Systems Overview is a 100 percent individualized self-study course. Material in this course is presented by means of audiotape, audio/microfiche, text readings, reference readings, exercises, and PLATO assisted learning (PAL). The student's progress and testing during the course are controlled by PLATO Learning Management (PLM).

Topics covered in this course include an introduction to CYBER systems; concepts and operation of the PPS, CSU, CMC, and CPU sections at a simplified block diagram level; deadstart concepts; exchange jump concepts; basic operating system concepts; peripheral equipment types and characteristics; mainframe physical characteristics; and an introduction to basic maintenance aids and tools. Table 1-1 lists the sequence of modules.

TABLE 1-1. MODULE SEQUENCE AND LENGTHS

Sequence	Title	Estimated Length (Hours)
1	Introduction to the Basic System	2.25
2	Peripheral Processor Concepts	4.5
3	Deadstart Concepts	1.5
4	Central Memory and CM Control Concepts	2.5
5	Central Processor Unit Concepts	5.0
6	Exchange Jump Concepts	1.5
7	System Configuration--Hardware	2.0
8	System Configuration--Software	1.5

TABLE 1-1. MODULE SEQUENCE AND LENGTHS (Contd)

Sequence	Title	Estimated Length (Hours)
9	CYBER Systems Physical Layout	1.5
10	CYBER Systems Physical Layout	2.0
11	CYBER 70 Differences (Optional)	4.0

GOALS

Upon completing the CYBER Systems Overview course, the student will know the concepts of the basic CYBER systems at a simplified block diagram level. No maintenance skills are taught in this course. However, the student will understand the concepts necessary to learn maintenance skills in subsequent training courses.

PREREQUISITES

The student enrolled in this course must know the:

- Four basic parts of a computer and the way they interact with each other
- Purpose and structure of a computer register
- General concepts of data flow in a computer system
- Binary and octal numbering systems
- Basic structure and function of machine language instructions

The student can obtain this knowledge by successfully completing the Introduction to Computer Hardware course (I3121).

LENGTH

Because this course is individualized, its length varies according to the student's knowledge and experience. The average time to complete this course is 4 days.

SECTION 2

COURSE STRUCTURE

CYBER Systems Overview is divided into 11 modules of instruction. Modules 1 through 10 are required. Module 11 is required only if you are working on CYBER 70 systems. Each module consists of a number of learning activities and a PLM test. Each learning activity teaches one or more instructional objectives.

DELIVERY CONSIDERATIONS

The CYBER Systems Overview course can be delivered wherever the student has access to a PLATO terminal and the necessary delivery equipment. Refer to section 3 for details.

LEARNING ACTIVITIES

The following learning activity table (table 2-1) provides the number, the title, and a brief description of each learning activity included in CYBER Systems Overview. The table also indicates the medium used and the estimated time to complete each learning activity. This information can help you schedule equipment usage efficiently. The table also references each learning activity to its objective(s) by number. A list of the course objectives follows the learning activity.

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE

MODULE 1

Learning Activity	Description	Median Time to Complete	Objective Number
1-A	Text Reading: History of CDC CYBER Computers. This learning activity presents a brief history of the development of Control Data CYBER computers.	15 min.	1

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 1 (Contd)

Learning Activity	Description	Median Time to Complete	Objective Number
1-B	Audio/Microfiche: Basic System Components. This learning activity presents the basic components of a CYBER system and the way they relate to each other.	25 min.	2
1-C	Exercise: System Components and Functions. This learning activity reinforces what was learned in learning activity 1-B.	25 min.	2
1-D	Text Reading: Additional System Components. This learning activity identifies additional components necessary to make up a usable CYBER system.	20 min.	3
1-E	Reference Reading: Characteristics of CYBER 170 systems. This learning activity describes the different types of configurations and systems available in the CYBER 170 computer series.	25 min.	4
1-F	Exercise: Review of CYBER 170 System. This learning activity reinforces what was learned in learning activity 1-E.	25 min.	4

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 2			
Learning Activity	Description	Median Time to Complete	Objective Number
2-A	Audiotape: PPU Memory, Registers and Adders. This learning activity presents the functions and characteristics of the PPU's basic internal hardware.	40 min.	5
2-B	Audio/Microfiche: PPU Instruction and Operand Format. This learning activity presents the various operand and instruction formats used by CYBER PPUs.	40 min.	6
2-C	Exercise: CYBER PPUs. This learning activity reinforces what was learned in learning activities 2-A and 2-B.	40 min.	5,6
2-D	Audio/Microfiche: PPU Communications with I/O Channels and Central Memory. This learning activity describes how CYBER PPUs communicate with peripheral equipment and with central memory.	35 min.	7,8
2-E	Exercise: Review of PPU Communications. This learning activity reinforces what was learned in learning activity 2-D.	30 min.	7,8

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 2 (Contd)			
Learning Activity	Description	Median Time to Complete	Objective Number
2-F	Audio/Microfiche: CYBER 170 PPU Slot/Barrel Concepts. This learning activity presents how the PPS operates more efficiently by sharing hardware registers.	30 min.	9
2-G	Exercise: Review of CYBER 170 PPU Slot/Barrel Concepts. This learning activity reinforces what was learned in learning activity 2-F.	35 min.	9
2-H	Reference Reading: CYBER 176 First Level Peripheral Processor (FLPP). This learning activity describes the function and characteristics of the FLPP in a CYBER 176 system.	20 min.	10

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 3

Learning Activity	Description	Median Time to Complete	Objective Number
3-A	Text Reading: Purpose of Deadstart. This learning activity explains the purpose of the control sequence called deadstart.	50 min.	11
3-B	Audiotape: Deadstart Panel and Data Paths. This learning activity presents the functions of the deadstart panel on the CYBER 170 systems. It also covers the data paths used during deadstart operations.	40 min.	12

MODULE 4

Learning Activity	Description	Median Time to Complete	Objective Number
4-A	Audio/Microfiche: CYBER 170 Memory Concepts. This learning activity teaches the basic concepts of the CYBER 170 system memory. Topics include memory layout, phasing, and addressing.	40 min.	13,14
4-B	Exercise: Review of CYBER 170 Memory Concepts. This learning activity reinforces what was learned in learning activity 4-A.	35 min.	13,14

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 4 (Contd)

Learning Activity	Description	Median Time to Complete	Objective Number
4-C	Audio/Microfiche: CYBER 170 CMC and CSU Block Diagrams. This learning activity explains the operation of CMC and CSU at a simplified block diagram level.	40 min.	15,16
4-D	Exercise: Review of CYBER 170 CMC and CSU. This learning activity reinforces what was learned in learning activity 4-C.	35 min.	15,16

MODULE 5

Learning Activity	Description	Median Time to Complete	Objective Number
5-A	Text Reading: CPU Functions. This learning activity describes the functions of the CPU.	20 min.	17
5-B	Audio/Microfiche: Serial Processor Block Diagram. This learning activity describes the function and purpose of various registers and sections of a serial type of CPU.	55 min.	18,19

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 5 (Contd)

Learning Activity	Description	Median Time to Complete	Objective Number
5-C	Exercise: Review of Serial Processor Block Diagram. This learning activity reinforces what was learned in learning activity 5-B.	30 min.	18,19
5-D	Audio/Microfiche: CPU Instruction and Operand Format. This learning activity describes the basic operand and instruction formats used in a CYBER system CPU.	40 min.	20,21,22
5-E	Exercise: Review of CPU Instruction Operand Formats. This learning activity reinforces what was learned in learning activity 5-D.	30 min.	20,21,22
5-F	Audio/Microfiche: Serial Processor Data Flow. This learning activity describes how the serial type of CPU executes basic instructions and how data flows through the CPU during CM reads and writes.	55 min.	23,24
5-G	Exercise: Review of Serial Processor Data Flow. This learning activity reinforces what was learned in learning activity 5-F.	35 min.	23,24

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 5 (Contd)

Learning Activity	Description	Median Time to Complete	Objective Number
5-H	Reference Reading: Parallel Processor Block Diagram. This learning activity explains the concepts of a parallel processor type of CPU and the way it operates within a CYBER system.	35 min.	25

MODULE 6

Learning Activity	Description	Median Time to Complete	Objective Number
6-A	Text Reading: Purpose of the Exchange Jump. This learning activity explains the uses of the exchange jump operation.	45 min.	26
6-B	Audio/Microfiche: Exchange Package Format. This learning activity describes contents of the exchange package and the sequence of events that occurs during an exchange jump operation.	45 min.	27,28

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 7

Learning Activity	Description	Median Time to Complete	Objective Number
7-A	Audio/Microfiche: Minimum Systems Components. This learning activity explains what components of a CYBER mainframe and what types of peripheral equipment are included in a minimum CYBER system.	45 min.	29
7-B	Text Reading: Hardware Options. This learning activity describes some of the optional hardware available on a CYBER system.	30 min.	30
7-C	Standard Peripherals. This learning activity describes the various peripheral equipment models used on a standard CYBER system.	45 min.	31

MODULE 8

Learning Activity	Description	Median Time to Complete	Objective Number
8-A	Text Reading: Basic Operating System. This learning activity explains the purpose of the operating system and describes the functions of the major sections of an operating system.	30 min.	32

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 8 (Contd)

Learning Activity	Description	Median Time to Complete	Objective Number
8-B	PLATO Lesson: Operating System Concepts. This learning activity explains how a user's job is executed under control of the operating system.	60 min.	33

MODULE 9

Learning Activity	Description	Median Time to Complete	Objective Number
9-A	Audio/Microfiche: CYBER 170 Systems. This learning activity shows where the various sections of a CYBER 170 system are physically located.	30 min.	34,35
9-B	Reference Reading: Systems Layout. This learning activity further explains the physical layout of a CYBER 170 system.	30 min.	36
9-C	Exercise: Review. This learning activity reinforces what was learned in learning activities 9-A and 9-B.	30 min.	34,35,36

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 10

Learning Activity	Description	Median Time to Complete	Objective Number
10-A	Reference Reading: CYBER 17X Status and Control Register. This learning activity describes the meaning of the bits in the SCR.	60 min.	37
10-B	Text Reading: Maintenance Aids and Tools. This learning activity presents ways to test the CYBER system to determine whether it is operating properly.	30 min.	38
10-C	Text Reading: Hardware Documentation. This learning activity identifies some of the documentation available for a CYBER system.	30 min.	39

MODULE 11

Learning Activity	Description	Median Time to Complete	Objective Number
11-A	Text Reading: Characteristics of CYBER 70 Systems. This learning activity describes the characteristics of the three basic models in the CYBER 70 series.	25 min.	40

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 11 (Contd)

Learning Activity	Description	Median Time to Complete	Objective Number
11-B	Exercise: Review of CYBER 70 Systems. This learning activity reinforces what was learned in learning activity 11-A.	20 min.	40
11-C	Text Reading: CYBER 70 Slot/Barrel Concepts. This learning activity describes how CYBER 70 PPUs share common arithmetic hardware.	25 min.	41
11-D	Text Reading: CYBER 70 Deadstart Panel and Data Paths. During this activity you learn the functions of the CYBER 70 systems deadstart panel. You also learn the data paths used during deadstart operations.	20 min.	42
11-E	Text Reading: CYBER 70 Memory Concepts. This learning activity presents the basic concepts of CYBER 70 memories, including layout, phasing, and addressing.	30 min.	43
11-F	Exercise: Review of CYBER 70 Memory Concepts. This learning activity reinforces what was learned in learning activity 11-E.	30 min.	43

TABLE 2-1. LEARNING ACTIVITY SUMMARY BY MODULE (Contd)

MODULE 11 (Contd)

Learning Activity	Description	Median Time to Complete	Objective Number
11-G	Audio/Microfiche: CYBER 70 CMC and CM Block Diagrams. This learning activity describes how CMC and CM operate at a block diagram level.	35 min.	44
11-H	Exercise: Review of CYBER 70 CMC and CM. This learning activity reinforces what was learned in learning activity 11-G.	30 min.	44
11-I	Audio/Microfiche: CYBER 7X System. This learning activity shows how a typical CYBER 7X system is physically constructed.	25 min.	45

CYBER Systems Overview
Section 2

OBJECTIVES

The following list contains all the objectives for the CYBER Systems Overview course. Each objective is assigned a number that is referenced in the preceding learning activity table.

The objective statements are also listed in the student manual for the course and the PLATO terminal. The learning activity number and the objective number provide a cross-reference to a specific learning activity.

OBJECTIVE LIST

Upon completing the CYBER Systems Overview course, the student will be able to:

1. Follow the development of Control Data's CYBER product line from the early systems to today's systems.

2. Describe the four basic sections of the CYBER mainframe and the relationship between them.

3. Identify and describe the additional components necessary to make up a usable CYBER system.

4. Describe the characteristics of any CYBER 170 system by knowing its product number.

5. List the basic registers and adders of a PPU and state the function and characteristics of each.

6. Trace the data and address paths used by the various types of instruction formats through a PPU block diagram.

7. List the registers used to input and output data on the channels and trace I/O data paths through a block diagram.

8. List the read/write pyramids' functions and registers and trace data paths between the PPU and CM through a block diagram.

9. State the purpose of slot/barrel concepts used in CYBER 17X PPUs by listing the advantages provided by this type of hardware design.

10. State the similarities and differences between a CYBER 176 PPU (FLPP) and a CYBER 170 PPS processor.

OBJECTIVE LIST (Contd)

11. Describe the purpose of deadstart in a CYBER mainframe.

12. Define the options available on the CYBER 17X deadstart panel and follow the sequence of events during deadstart load, sweep, and dump operations.

13. Define what is included in a CYBER 170 central storage unit (CSU) bank, quadrant, and chassis.

14. Define the function of the address bits in a CYBER 170 CM address word.

15. Trace data and address paths through block diagrams of the CYBER 170 CMC and CSU.

16. Define the purpose and operation of SECDED in the CYBER 170 CM.

17. State the functions the CPU serves within a CYBER system.

18. State the function and size of the CPU operand and control registers.

19. List the characteristics and functions of the registers in the serial CPU large arithmetic section and small arithmetic section.

20. Define the instruction designators used in 15-bit and 30-bit CPU instruction.

21. List the three types of operand formats used in the CPU.

22. Define the terms instruction word and parcel as they relate to CPU operations.

23. Trace data flow through the various sections and registers of a CPU block diagram during the execution of an instruction.

24. Trace address and data paths used during a reference to CM by the CPU.

25. List the characteristics and state the functions of the Instruction Address Stack, Instruction Word Stack, CIW register, and functional units of a parallel processor CPU.

OBJECTIVE LIST (Contd)

26. Explain the purpose of an exchange jump operation within a CYBER system.

27. Describe the sequence of events that occurs after an EXCHANGE JUMP command has been issued.

28. List the content(s) of the exchange jump package.

29. Identify and describe the components necessary to make up a minimum CYBER system.

30. Describe three hardware options available on the CYBER system.

31. Identify the product numbers of the standard peripheral equipment on a CYBER system.

32. Define the basic terms used in a typical operating system.

33. Trace through a block diagram of the system the basic data paths used during the execution of a job.

34. Describe the physical layout of the CYBER 17X systems, including bay contents, chassis contents, and logic types.

35. Describe the function of the power and environmental control components in a CYBER 17X system.

36. Describe the physical characteristics of the CYBER 17X systems.

37. Define the meaning and function of each bit in the Status and Control register of a CYBER 17X system.

38. Identify four items that assist a CE in maintaining and troubleshooting a CYBER system.

39. Identify the manual types for a computer system and be able to locate manual publication numbers.

Upon completion of the Optional CYBER 70 Difference module (module 11) the student will be able to:

40. Describe the characteristics of the different types of mainframes in the CYBER 70 series product line.

41. State the purpose of slot/barrel concept used in CYBER 7X PPUs by listing the advantages provided by this type of hardware design.

42. Define the options available on the CYBER 7X deadstart panel and follow the sequence of events during deadstart load, sweep, and dump operations.

43. Describe the layout of the CYBER 70 CM, including chassis and bank structure and CM address formats.

44. Follow address and data paths through block diagrams of the CYBER 70 CMC and CM.

45. Describe the physical characteristics and layout of the CYBER 7X system, including bay contents, chassis contents, and logic type.

SECTION 3

RESOURCES

This section describes the equipment needed to deliver the CYBER Systems Overview course. It also provides the publication numbers for materials used in the course.

REQUIRED EQUIPMENT

The following equipment is required for the student to complete the course.

- PLATO terminal
- Audio cassette tape playback unit
- Headphone for audio/visual equipment
- Microfiche reader--dual lens magnification w/24X (29mm) and 42X (17mm) lenses

PRINTED MATERIALS

Two types of printed materials are used in the course: student training materials and reference materials. A description of each type and ordering information follow.

STUDENT TRAINING MATERIALS

The student training materials package consists of two binders containing the student manual and the audio/visual media.

The entire student training materials package is distributed under one Control Data publication number.

Title	Publication Number
CYBER Systems Overview	75445178

To order the student training materials, complete an Educational Material Request form (form number AA6179) and send it to the Engineering Services Education Distribution Center.

The student manual is a self-explanatory workbook that guides the student through the course. It contains all the text readings and exercises for the course, as well as introductions and instructions for the audio/visual, PLATO, and reference reading activities. The student should be encouraged to used the student manual for taking notes as needed.

The audio/visual media for this course consist of 17 audiotapes and 15 colored microfiche. Each microfiche has a corresponding audiotape. The student is directed to view the microfiche while listening to the tape. An audible tone at the end of each frame on the tape directs the student to go on to the next microfiche frame.

The following list of audio/microfiche titles identifies the learning activities that use audio/microfiche media.

Audio/Microfiche Title	Learning Activity Number
Basic System Components	1-B
PPU Instruction and Operand Formats	2-B
Communications with I/O Channels and Central Memory	2-D
CYBER 170 PPU Slot/Barrel Concepts	2-F
CYBER 170 Central Memory Concepts	4-A
CYBER 170 CMC and CSU Block Diagrams	4-C
Serial Processor Block Diagram	5-B
CPU Instruction and Operand Formats	5-D
Serial Processor Data Flow	5-F
Exchange Package Format	6-B
Minimum System Components	7-A
Standard Peripherals: CYBER Systems	7-C
CYBER 170 Physical Characteristics	9-A
CYBER 70 Central Memory Block Diagrams	11-G
CYBER 70 Physical Characteristics	11-I

Two learning activities in the course use the audio medium only. During these two activities, the student is directed to look at figures in the student manual while listening to the tape. The audio-only learning activities number/and the audiotape titles are:

Audio/Microfiche Title	Learning Activity Number
CYBER System Basic PPU Block Diagram	2-A
Deadstart Panel and Data Paths	3-B

REFERENCE MATERIALS

Reference materials are any printed matter (manuals, books, pamphlets, and so forth) not included in the student manual.

A list of reference manuals used in CYBER Systems Overview follows.

Title	Publication Number
CYBER 170 Models 171 through 175 (levels A,B,C) Model 176 (level A) Hardware Reference Manual	60420000
CYBER 170 Models 720, 730, 750, 760 Model 176 (level B) Hardware Reference Manual	GF60456100
CYBER 70 Models 72 and 73 Hardware Reference Manual, volume 1	60347000*
CYBER 70 Model 74 Hardware Reference Manual, volume 1	60347400*
CYBER 170 Models 865 and 875 Hardware Reference Manual	60458920**

To order these manuals, complete a Literature/Forms Request form (form number AA1538-2) and send it to Literature and Distribution Services (LDS).

RETURN OF MATERIALS

When the student has completed the course, he/she may keep the student training materials. The reference materials used, should be returned if they were library copies, otherwise they may be kept.

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* These manuals are needed only if you are taking the optional CYBER 70 module.

** This manual is needed only if you are going to be on a Model 865 or 875 machine.

SECTION 4

SPECIAL INSTRUCTIONS

This section provides special directions for the course administrator or technical advisor.

CYBER Systems Overview does not require any special instructions. Administration of this course can be accomplished by following the procedures given in the ESE Guide for the Delivery of Individualized Training.

COMMENT SHEET

MANUAL TITLE CYBER SYSTEMS OVERVIEW

PUBLICATION NO. 75445361 REVISION B Prod. No. R0101

FROM: NAME:

BUSINESS ADDRESS:

COMMENTS:

This form is not intended to be used as an order blank. Your evaluation of this manual will be welcomed by Control Data Corporation. Any errors, suggested additions or deletions, or general comments may be made below. Please include page number references and fill in publication revision level as shown by the last entry on the Record of Revision page at the front of the manual.

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