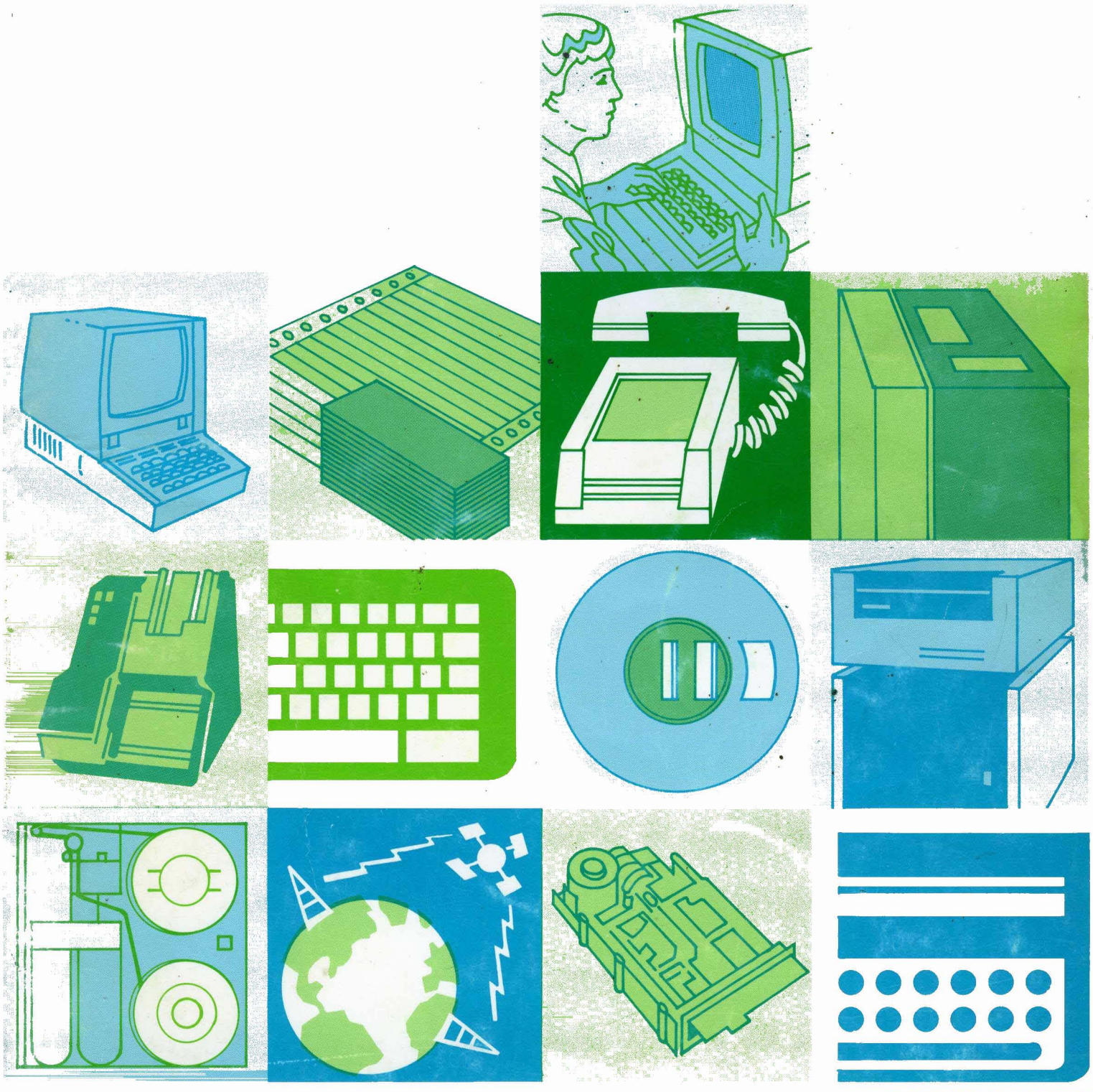
CONTROL DATA

Magnetic Storage Equipment

Version W



LEARNING GUIDE

MAGNETIC STORAGE EQUIPMENT

LEARNING GUIDE

CONTROL DATA

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MAGNETIC STORAGE EQUIPMENT

This unit introduces you to the operation and maintenance of specific tape and disk drives. It describes the characteristics, functions, and components of these devices and analyzes the logic of the tape drive, disk drive, and flexible disk as well as the respective interface controllers.

BLOCK 1: INTRODUCTION TO BW-303 MAGNETIC TAPE TRANSPORT

This block presents an overview of the operation and subassemblies of the tape drive. You perform a lab activity to further familiarize yourself with tape drive operations

BLOCK 1: INTRODUCTION TO BW-303 MAGNETIC TAPE TRANSPORT

OBJECTIVE

- Identify physical characteristics, interface characteristics, physical configuration, and physical specifications of a tape drive.

___1-A BW-303 GENERAL DESCRIPTION

This activity is designed to give you an overall introduction to characteristics of the tape drive.

Resource

Audio/ Text	"BW-303 General Description," pub. no. 76362490; pages 1-8. Follow text while listening to tape.

OBJECTIVE

- Identify the functions of all operator switches, indicators, and controls.

___1-B OPERATING INSTRUCTIONS

This activity acquaints you with all operator controls and indicators.

Resources

CBE	"Operating Instructions" (PLATO course disk ct-per6, pub. no. 76773092)
Text/ Reference	Control Data Magnetic Tape Reference Manual, pub. no. 49756300, pages 2-1 through 2-4. Follow manual while completing CBE activity (see Implementation Guide for sign-on instructions).

OBJECTIVE

- o Identify major operator controls and mechanical assemblies.

___1-C COMPONENT LOCATION AND OPERATION

This activity is performed in the lab and familiarizes you with the tape drive operation. You also locate and identify major tape drive subassemblies.

Resource

Lab/ Text	"Component Location and Operation," pages 9-17

BLOCK 2: THEORY OF OPERATION

This block analyzes the logical operations of tape transports. You study block diagrams of tape transport subsystems and explanations of recording techniques and formats, and follow flowcharts for the READY, LOAD, REWIND, UNLOAD, READ, and WRITE operations.

BLOCK 2: THEORY OF OPERATION

OBJECTIVE

- o Identify the function of each block of a tape transport block diagram.

___2-A BW-303 FUNCTIONAL DESCRIPTION

This activity describes the interfacing relationship between transport logic and the tape control unit.

Resource

Audio/ Text	"BW-303 Functional Description," pub. no. 76362491; pages 19-20. Follow text while listening to tape.

OBJECTIVE

- o Identify purposes of each block of capstan control logic, reel control logic, and associated timing relationships.

___2-B SUBSYSTEM FUNCTIONAL ANALYSIS

This activity describes the principles of operation of each major equipment component and grouping or subsystem within the tape transport.

Resources

CBE	"Subsystem Functional Analysis" (PLATO course disk ct-per6, pub. no. 76773092)
Text/ Reference	Control Data Magnetic Tape Transport Reference Manual, pub. no. 49756300, pages 3-1 through 3-8. Follow manual while completing CBE activity (see Implementation Guide for sign-on instructions).

OBJECTIVE

- o Identify tape recording formats and phase modulation techniques.

___2-C RECORDING TECHNIQUES AND FORMAT

This activity covers tape composition, NRZI definitions, and recording phase modulation techniques.

Resources

CBE	"Recording Techniques and Format" (PLATO course disk ct-per6, pub. no. 76773092)
Text/ Reference	Control Data Magnetic Tape Transport Reference Manual, pub. no. 49756300, pages 3-8 through 3-11. Follow manual while completing CBE activity (see Implementation Guide for sign-on instructions).

OBJECTIVE

- o Identify, from the ready flow diagram, the logic conditions required to establish a tape READY condition.

___2-D READY OPERATION

This activity introduces you to all of the logic and controlling conditions that are necessary to send READY to the controller.

Resource

Text/ Reading	"READY Operation," pages 21-22

OBJECTIVE

- Identify the sequence of logic events that occurs during the LOAD operation.

___2-E LOAD OPERATION

This activity describes all the logic events that occur during the LOAD operation.

Resource

Text/ Reference: Control Data Magnetic Tape Transport Reference Manual, pub. no. 49756300, pages 3-12 and 3-18 through 3-23

OBJECTIVE

- Identify the sequence of logic events that occurs during the REWIND operation.

___2-F REWIND OPERATION

This activity describes all of the logic events that occur during the REWIND operation.

Resource

Text/ Reference: Control Data Magnetic Tape Transport Reference Manual, pub. no. 49756300, pages 3-12 through 3-13 and 3-24 through 3-29

OBJECTIVE

- o Identify the sequence of logic events that occurs during the UNLOAD operation.

___2-G UNLOAD OPERATION

This activity describes all of the logic events that occur during the UNLOAD operation.

Resource

Text/ Reference	Control Data Magnetic Tape Transport Reference Manual, pub. no. 49756300, pages 3-13 and 3-30 through 3-33

OBJECTIVE

- o Identify the sequence of logic events that occurs during the READ operation.

___2-H READ OPERATION

This activity describes all of the logic events that occur during the READ operation.

Resource

Text/ Reference	Control Data Magnetic Tape Transport Reference Manual, pub. no. 49756300, pages 3-13 through 3-14

OBJECTIVE

- o Identify the sequence of logic events that occurs during the WRITE operation.

___2-I WRITE OPERATION

This activity describes all of the logic events that occur during the WRITE operation.

Resource

Text/ Reading "Write Operation," pages 23-26

BLOCK 3: MAINTENANCE PROCEDURES

This block introduces you to the concept of preventive maintenance and describes preventive maintenance procedures. You study a maintenance procedure in a service manual and then perform that procedure in a laboratory activity.

BLOCK 3: MAINTENANCE PROCEDURES

OBJECTIVE

- o Identify preventive maintenance procedures.

___3-A PREVENTIVE MAINTENANCE

This activity describes the purposes of preventive maintenance and preventive maintenance indexes.

Resource

Audio	"Preventive Maintenance," pub. no. 76362492

___3-B PREVENTIVE MAINTENANCE PROCEDURES

This activity describes preventive maintenance procedures.

Resource

Audio/ Text	"Preventive Maintenance Procedures," pub. no. 76362493; pages 27-28. Follow text while listening to tape.

___3-C PREVENTIVE MAINTENANCE PROCEDURES LAB

In this activity, you perform preventive maintenance procedures.

Resource

Lab/ Reference	Control Data Magnetic Tape Transport Field Service Manual, pub. no. 49756400, pages 2-6 through 2-8

OBJECTIVE

- o Perform selected alignments.

___3-D BW-303 HARDWARE LAB #1

In this activity, you perform disassembly, reassembly, and adjustment procedures on the tape transport.

Resource

Lab/ Reference — Control Data Magnetic Tape Transport Field Service Manual, pub. no. 49756400, pages 2-20A through 2-27 and 2-31 through 2-33

OBJECTIVE

- o Perform selected alignments.

___3-E BW-303 HARDWARE LAB #2

In this activity, you perform disassembly, reassembly, and adjustment procedures on the tape transport.

Resource

Lab/ Reference — Control Data Magnetic Tape Transport Field Service Manual, pub. no. 49756400, pages 2-34 through 2-40

OBJECTIVE

- o Identify proper signals, and perform selected adjustments.

___3-F MAGNETIC TAPE ELECTRICAL LAB

In this activity, you observe the typical signals and make the adjustments common to a majority of magnetic tape drives, utilizing a dual trace oscilloscope.

Resource

Lab/ Text — "Magnetic Tape Electrical Lab," pages 29-39

OBJECTIVE

o Repair simulated problem.

___3-G TAPE TROUBLESHOOTING LAB

In this activity, you are presented with a series of problems associated with the tape transport system. It is up to you to decide what manuals are needed.

Resource

CBE "Tape Troubleshooting Lab"
(PLATO course disk ct-per7, pub. no. 76773093)

BLOCK 4: MAGNETIC TAPE CONTROLLER FA-107A

This block introduces you to the CDC FA-107A magnetic tape controller. It gives a general description of the FA-107A and then goes into more detail on the operation, logic, and testing of the unit. You study block diagrams and follow flowcharts and sample programs.

BLOCK 4: MAGNETIC TAPE CONTROLLER FA-107A

OBJECTIVE

- o Identify general characteristics of the FA-107A magnetic tape controller.

___4-A FA-107A GENERAL DESCRIPTION

This activity gives a general description of the FA-107A magnetic tape controller.

Resource

Audio/ Text	"FA-107A General Description," pub. no. 76362494; page 41. Follow text while listening to tape.

OBJECTIVE

- o Identify operating characteristics of the FA-107A.

___4-B OPERATION

This activity describes how the FA-107A operates.

Resource

Text/ Reference	CDC Magnetic Tape Controller FA-107A Hardware Reference/Maintenance Manual, pub. no. 96728600, pages 2-1 through 2-7

OBJECTIVE

- o Identify the logical operations of the FA-107A.

___4-C THEORY OF OPERATION

This activity describes the logical operations of the FA-107A.

Resource

Text/ Reference	CDC Magnetic Tape Controller FA-107A Hardware Reference/Maintenance Manual, pub. no. 96728600, pages 4-1 through 4-25

OBJECTIVE

- o Identify the logic diagram sheets for the functional areas of the FA-107A.

___4-D BW-812 TAPE TRANSLATOR

This activity describes the logic in the functional areas of the FA-107A.

Resource

Audio/ Text	"BW-812 Tape Translator," pub. no. 76362495; pages 42-51. Follow text while listening to tape.

OBJECTIVE

- o Identify procedures for testing the FA-107A and identifying and removing defective boards.

___4-E MAINTENANCE

This activity describes procedures for testing the logic circuitry of the FA-107A and for identifying and removing defective boards.

Resource

Text/ Reference	CDC Magnetic Tape Controller FA-107A Hardware Reference/Maintenance Manual, pub. no. 96728600, pages 6-1 through 6-7

BLOCK 5: INTRODUCTION TO THE STORAGE MODULE DRIVE

This block introduces you to the storage module drive unit. You analyze terms, descriptions, and functions that apply to the storage module drive as well as to the location of assemblies in the unit.

BLOCK 5: INTRODUCTION TO THE STORAGE MODULE DRIVE

OBJECTIVE

- o Identify specifications and characteristics of the storage module drive.

___5-A SMD SPECIFICATIONS

This activity describes the general specifications and characteristics of the storage module drive.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 1-1 through 1-2

OBJECTIVE

- o Identify the functions of subassemblies of the storage module drive.

___5-B ASSEMBLY COMPONENT LOCATION

This activity describes the functions of the subassemblies of the storage module drive.

Resource

Text/ Reading: "Assembly Component Location," pages 53-63

___5-C DESCRIPTIONS OF COMPONENTS

This activity describes the functions and locations of the subassemblies of the storage module drive.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 1-3 through 1-6, 3-3 through 3-7, and 3-13

OBJECTIVE

- Identify the location and functions of the deck assemblies.

___5-D DECK ASSEMBLIES

This activity describes the location and functions of the deck assemblies.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-7 through 3-13

BLOCK 6: FAMILIARIZATION

This block familiarizes you with the storage module drive by pointing out its controls, indicators, and assemblies. You operate the unit by installing a disk pack, powering-up and powering-down the unit, and removing the disk pack.

BLOCK 6: FAMILIARIZATION

OBJECTIVE

- Identify the functions of the controls and indicators on the storage module drive.

___6-A CONTROLS AND INDICATORS

This activity describes the controls and indicators on the storage module drive.

Resource

Text/ Reference	Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 2-2 through 2-4

OBJECTIVE

- Identify the assemblies of a storage module drive and their functions.

___6-B COMPONENT LOCATION LAB

In this activity, you examine a storage module drive and locate its assemblies.

Resource

Lab/ Text	"Component Location Lab," pages 65-72

OBJECTIVE

- Install a disk pack, power-up the storage module drive, power-down the unit, and remove the disk pack.

___6-C OPERATING THE STORAGE MODULE DRIVE

In this activity, you install a disk pack, power-up and power-down the unit, and remove the disk pack.

Resource

Lab/Text "Operating the Storage Module Drive," page 73

BLOCK 7: STORAGE MODULE DRIVE ELECTRONICS

This block describes the electronic logic circuits that control the assemblies on the storage module drive. You study the names of the circuits and operations, the functions of elements in the circuits, and the sequence of events in the operations.

BLOCK 7: STORAGE MODULE DRIVE ELECTRONICS

OBJECTIVE

- o Identify the functions of the elements of a track servo electronic unit.

___7-A SMD SERVO OPERATIONS

This activity describes the functions of the elements of a track servo electronic unit.

Resource

CBE "SMD Servo Operations"
(PLATO course disk ct-per7, pub. no. 76773093)

___7-B TRACK SERVO THEORY

This activity describes the track servo circuit and the functions of its elements.

Resource

Text/ Reference Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-41 through 3-48

OBJECTIVE

- o Identify the functions of the elements of a servo circuit.

___7-C SERVO CIRCUIT OPERATION

This activity block diagrams a servo circuit and describes the functions of each block.

Resource

Text/ Reference Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-23 through 3-26

OBJECTIVE

- o Identify various types of seeks and their operation.

___7-D INTRODUCTION TO TYPES OF SEEKS

This activity shows you the various seeks (RTZ, first seek, and so forth) and describes the operations required to perform them.

Resource

CBE	"Introduction to Types of Seeks" (PLATO course disk ct-per7, pub. no. 76773093)

OBJECTIVE

- o Identify the functions of the elements of a basic seek circuit.

___7-E BASIC SEEK OPERATION

This activity block diagrams a basic seek circuit and describes the functions of the elements of the circuit.

Resource

Text/ Reference	Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-26 through 3-29

OBJECTIVE

- Identify the sequence of events that occurs during the first seek operation.

___7-F FIRST SEEK

This activity describes the sequence of events that occurs during the first seek operation.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-29 through 3-34

OBJECTIVE

- Identify the functions of the elements in a forward/reverse direct seek operation.

___7-G DIRECT SEEK (FORWARD/REVERSE)

This activity diagrams the direct seek operation and describes the functions of elements in the operation.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-30 and 3-35 through 3-38

OBJECTIVE

- o Identify the functions of the elements in a return to zero seek operation.

___7-H RETURN TO ZERO SEEK

This activity diagrams the return to zero seek operation and describes the functions of elements in the operation.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-38 through 3-41

OBJECTIVE

- o Identify the sequence of events that occurs during the end of travel detection.

___7-I END OF TRAVEL DETECTION

This activity describes the sequence of events that occurs during the end of travel detection.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-41

BLOCK 8: INDEX AND SECTOR DETECTION

This block describes the circuits that function in detecting index and sector of the storage module. You study terms, descriptions, and block diagrams of the circuits.

BLOCK 8: INDEX AND SECTOR DETECTION

OBJECTIVE

- Identify characteristics and functions of the servo and write clock frequency multipliers.

___8-A SERVO AND WRITE CLOCK

This activity describes the servo and write clock frequency multipliers.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-48 through 3-50

OBJECTIVE

- Identify the characteristics of an index detection circuit.

___8-B INDEX DETECTION

This activity describes the index detection circuit.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, page 3-50

OBJECTIVE

- Identify the characteristics of a sector detection circuit.

___8-C SECTOR DETECTION

This activity describes the sector detection circuit.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-50 through 3-51

OBJECTIVE

- Identify the characteristics of a rotational position sensing circuit.

___8-D ROTATIONAL POSITION SENSING

This activity introduces the circuitry and function of the index pulse circuitry.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-52 through 3-54

BLOCK 9: READ/WRITE CIRCUITRY

This block describes the circuitry involved in reading and writing information in the storage module drive. You study the names of the circuits and the characteristics of those circuits.

BLOCK 9: READ/WRITE CIRCUITRY

OBJECTIVE

- Identify characteristics of recording methods used on the storage module drive.

___9-A TRACK FORMAT AND RECORDING

This activity describes track format.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-52 and 3-56 through 3-60

___9-B PRINCIPLES OF RECORDING

This activity describes methods of recording information used on the storage module drive.

Resource

CBE: "Principles of Recording" (PLATO course disk ct-per7, pub. no. 76773093)

OBJECTIVE

- Identify the characteristics of head selection operation.

___9-C HEAD SELECTION

This activity describes the head selection operation.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, page 3-60

OBJECTIVE

- o Identify the circuits that are used in the read/write operation and their functions.

___9-D READ/WRITE CIRCUITS

This activity describes the read/write circuits.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-52 through 3-56 and 3-60

___9-E READ/WRITE OPERATIONS

This activity reinforces your knowledge of read/write circuits and operations.

Resource

CBE: "Read/Write Operations" (PLATO course disk ct-per7, pub. no. 76773093)

OBJECTIVE

- o Identify characteristics of the read analog to digital conversion circuitry.

___9-F DIGITAL CONVERSION

This activity describes the read analog to digital conversion circuitry.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-60 through 3-62

OBJECTIVE

- o Identify characteristics of the lock to data and address detection circuitry.

___9-G LOCK TO DATA AND ADDRESS DETECT

This activity introduces the lock to data and address detection circuitry.

Resource

Text/ Reference	Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-61 through 3-63

OBJECTIVE

- o Identify characteristics of the read PLO and data separator circuit.

___9-H READ PLO AND DATA SEPARATOR

This activity describes the read PLO and data separator circuit.

Resource

Text/ Reference	Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-61 and 3-64 through 3-68

OBJECTIVE

- o Identify characteristics of read/write operations.

___9-I WRITE OPERATION (SMD)

This activity describes the write circuitry.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-68 through 3-70

___9-J READ/WRITE OPERATIONS (SMD)

This exercise reinforces your knowledge of the read/write operation.

Resource

Text/ Exercise: "Read/Write Operations (SMD)," pages 75-76

OBJECTIVE

- o Identify fault conditions for the storage module drive and their characteristics.

___9-K FAULT CONDITIONS

This activity describes fault conditions for the storage module drive.

Resource

Text/ Reference: Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-71 through 3-73

BLOCK 10: PREVENTIVE MAINTENANCE

This block describes general maintenance, preventive maintenance, and troubleshooting techniques for the storage module drive. You perform maintenance techniques in lab activities and analyze SMD malfunctions in a CBE activity.

BLOCK 10: PREVENTIVE MAINTENANCE

OBJECTIVE

- Perform preventive maintenance on the storage module drive.

___10-A PREVENTIVE MAINTENANCE LAB

In this lab activity, you practice preventive maintenance techniques.

Resource

Lab/ Text	"Preventive Maintenance Lab," page 77

OBJECTIVE

- Perform voltage adjustments and velocity gain adjustments on the storage module drive.

___10-B SMD REVIEW

This activity reviews the SMD servo system terminology. It describes the application of the disk servo surface, magnetic patterns on the disk surface, waveforms for dibit signals, and the operation of the servo surface in establishing data tracks on the disk surface.

Resource

Text/ Reading	"SMD Review," pages 78-95

___10-C GENERAL MAINTENANCE AND ADJUSTMENT LAB

In this activity, you practice voltage and velocity gain adjustments on the storage module drive.

Resource

Lab/ Text	"General Maintenance and Adjustment Lab," pages 96-105

OBJECTIVE

- o Identify storage module drive malfunctions and corrective measures.

___10-D TROUBLESHOOTING--PERIPHERAL EQUIPMENT

This activity reinforces your knowledge of troubleshooting techniques. It is up to you to decide what manuals are needed to solve a practical problem.

Resource

CBE	"Troubleshooting--Peripheral Equipment" (PLATO course disk ct-per7, pub. no. 76773093)

BLOCK 11: SMD CONTROLLER

This block describes an SMD controller. You study terms and follow functional descriptions of the controller. You also examine how the controller formats information on the storage module disk.

BLOCK 11: SMD CONTROLLER

OBJECTIVE

- Identify the functional areas of the SMD controller and their functions.

___11-A FA727 FUNCTIONAL AREAS

This activity describes the functional areas of the SMD controller.

Resource

Text/ Reference	Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 1-1 through 1-4

OBJECTIVE

- Identify the primary parts of the track format and their functions.

___11-B TRACK FORMAT ORGANIZATION

This activity describes track formats and the functions of the track format parts.

Resource

Text/ Reference	Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 1-4 through 1-6

OBJECTIVE

- o Identify the controls and indicators on the SMD controller and their functions.

11-C CONTROLS AND INDICATORS

This activity describes the controls and indicators on the SMD controller and how the power supply provides the necessary voltages for the controller.

Resource

Text/ Reference	Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 2-1 through 2-3 and 4-1 through 4-5

BLOCK 12: INPUT/OUTPUT OPERATIONS

This block thoroughly analyzes the input/output operations of the SMD controller from the point of drive unit selection to read or write information on the disk pack. You study the sequences of events in all suboperations that occur in I/O.

BLOCK 12: INPUT/OUTPUT OPERATIONS

OBJECTIVE

- Identify interfacing lines with the SMD controller and their functions.

___12-A I/O INTERFACE LINES

This activity describes interfacing lines with the SMD controller.

Resources

Text/ Reference	Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-6, 4-7, 4-9, and A-1 through A-17, and Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-15 through 3-17

OBJECTIVE

- Identify the command of process timing functions.

___12-B COMMAND PROCESS TIMING FUNCTIONS

This activity describes the command of process timing functions.

Resource

Text/ Reference	Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-7 through 4-12

OBJECTIVE

- Identify the sequence of command processing logic functions that occurs in a typical command process.

___12-C TYPICAL COMMAND PROCESS

This activity flowcharts the command process and shows the typical sequence of command processing logic functions.

Resource

CBE	"Typical Command Process" (PLATO course disk ct-per7, pub. no. 76773093)

OBJECTIVE

- Identify the sequence of events that occurs during a controller select operation.

___12-D CONTROLLER SELECTION

This activity describes the sequence of events in controller selection.

Resource

Text/ Reference	Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-19 through 4-22

OBJECTIVE

- Identify the sequence of events that occurs in drive selection, and identify any possible error conditions.

12-E DRIVE SELECTION

This activity describes the sequence of events in drive selection as well as possible error codes.

Resource

Text/ Reference	Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-22 through 4-25

OBJECTIVE

- Identify the sequence of events that occurs in polling and the functions of those events.

12-F POLLING FUNCTIONAL DESCRIPTION

This activity analyzes the polling process and block diagrams it and the controller.

Resource

CBE	"Polling Functional Description" (PLATO course disk ct-per7, pub. no. 76773093)

OBJECTIVE

- o Identify the sequence of events that occurs in seek overlap.

___12-G SEEK OVERLAP

This activity describes the sequence of events in the seek overlap operation.

Resource

Text/ Reference — Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-29 through 4-31

OBJECTIVE

- o Identify the sequence of events that occurs in the seek initiation operation.

___12-H SEEK INITIATION

This activity describes the seek initiation operation.

Resource

Text/ Reference — Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-31 through 4-32

OBJECTIVE

- o Identify the sequence of events that occurs in auto polling and the functions of those events.

___12-I AUTO POLLING

This activity describes the auto polling operation.

Resource

Text/ Reference: Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-31 and 4-33 through 4-36

OBJECTIVE

- o Identify the sequence of events that occurs in poll updating.

___12-J POLL UPDATING

This activity describes the poll updating operation.

Resource

Text/ Reference: Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-34 and 4-39 through 4-41

OBJECTIVE

- o Identify the sequence of events that occurs in interrogate polling.

___12-K INTERROGATE POLLING

This activity describes the interrogate polling operation.

Resource

Text/ Reference	Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-38, 4-42, and 4-43

___12-L POLLING OPERATIONS

This activity reinforces your knowledge of polling operations.

Resource

Text/ Exercise	"Polling Operations," pages 107-108

OBJECTIVE

- o Identify the functional areas in the read/write circuit and their functions.

___12-M READ/WRITE CIRCUIT FUNCTIONS

This activity diagrams the read/write operations of the SMD controller and describes those operations.

Resource

CBE	"Read/Write Circuit Functions" (PLATO course disk ct-per7, pub. no. 76773093)

OBJECTIVE

- o Identify the read/write timing operations that are associated with particular areas of a typical disk format.

___12-N PLO

This activity describes the read/write timing operations associated with typical disk format areas.

Resource

Text/ Reference — Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-48 through 4-54

OBJECTIVE

- o Identify the basic functions of the gap count that are associated with the read/write sequencing control.

___12-O READ/WRITE SEQUENCE AND GAP CONTROL

This activity describes the read/write sequencing control and the gap control.

Resource

Text/ Reference — Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-54 through 4-60

OBJECTIVE

- Identify the sequence of events that occurs in rotational position sensing.

___12-P POSITION SENSING OPERATION

This activity describes the rotational position sensing operation.

Resource

Text/ Reference: Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-61 through 4-63

OBJECTIVE

- Identify the sequence of events that occurs in the write GapA/GapB operation.

___12-Q WRITE GapA/GapB OPERATION

This activity describes the write GapA/GapB operation.

Resource

Text/ Reference: Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-63 through 4-73

OBJECTIVE

- o Identify the sequence of events that occurs in the format write operation.

___12-R FORMAT WRITE

This activity describes the format write operation.

Resource

Text/ Reference: Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, page 4-73

OBJECTIVE

- o Identify the sequence of events that occurs during a read/write operation.

___12-S READ OPERATION (FA727)

This activity describes the read operation.

Resource

Text/ Reference: Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-73 through 4-79

OBJECTIVE

- o Identify read/write error conditions and the causes of those conditions.

___12-T READ/WRITE ERROR CONDITIONS

This activity describes read/write error conditions.

Resource

Text/ Reference: Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-78 through 4-82

OBJECTIVE

- Identify error correction code (ECC) functions that are used in a read/write operation.

___12-U ERROR CORRECTION

This activity describes how ECC functions are used in a read/write operation.

Resource

Text/ Reference	Control Data SMD Controller/Formatter FA727 and FA7A8 Hardware Maintenance Manual, pub. no. 83312400, pages 4-82 through 4-91

OBJECTIVE

- Identify the sequence of events that occurs during a read/write operation.

___12-V READ/WRITE OPERATIONS (FA727)

This exercise reinforces your knowledge of read/write operations.

Resource

Text/ Exercise	"Read/Write Operations (FA727)," pages 109-110

OBJECTIVE

- o Observe and identify typical I/O signals.

___12-W WAVEFORM OBSERVATION

This activity simulates an oscilloscope hooked up to an SMD so that you can see the waveform of typical I/O signals.

Resources

CBE	"Waveform Observation" (PLATO course disk ct-per7, pub. no. 76773093)
Text/ Reference	Control Data Storage Module Drive BJ701 and BJ7B1 Hardware Reference Manual, pub. no. 83317300, pages 3-23 through 3-33

BLOCK 13: FLEXIBLE DISK DRIVE

This block introduces you to the BR-803 flexible disk drive. You study its basic characteristics and the logic of its functions.

BLOCK 13: FLEXIBLE DISK DRIVE

OBJECTIVE

- Identify operating characteristics of the BR-803 flexible disk drive.

___13-A BR-803 FDD DESCRIPTION

This activity gives a general description of the BR-803.

Resource

Text/ Reference	Control Data Flexible Disk Drive Hardware Maintenance Manual, pub. no. 75736120, pages 1-1 through 1-4

OBJECTIVE

- Identify the functional areas of the BR-803 and their functions.

___13-B BASIC THEORY OF OPERATION

This activity diagrams the functional areas of the BR-803 and describes each area.

Resource

CBE	"Basic Theory of Operation" (PLATO course disk ct-per7, pub. no. 76773093)

OBJECTIVE

- o Identify the control logic functions.

___13-C CONTROL LOGIC FUNCTION

This activity describes control logic functions.

Resource

Text/ Reference: Control Data Flexible Disk Drive Hardware Maintenance Manual, pub. no. 75736120, pages 4-2 through 4-4

OBJECTIVE

- o Identify write and fault logic functions.

___13-D WRITE AND FAULT LOGIC FUNCTION

This activity describes write and fault logic functions.

Resource

Text/ Reference: Control Data Flexible Disk Drive Hardware Maintenance Manual, pub. no. 75736120, page 4-4

OBJECTIVE

- o Identify read logic functions.

___13-E READ LOGIC FUNCTION

This activity describes read logic functions.

Resource

Text/ Reference: Control Data Flexible Disk Drive Hardware Maintenance Manual, pub. no. 75736120, page 4-5

OBJECTIVE

- Identify switch operations on the BR-803.

___13-F DISK DRIVE

This activity describes switch operations on the BR-803.

Resource

Text/ Reference: Control Data Flexible Disk Drive Hardware Maintenance Manual, pub. no. 75736120, page 4-5

OBJECTIVE

- Identify I/O interface functions for the BR-803.

___13-G I/O LINES

This activity describes the input/output interface for the flexible disk drive.

Resource

Text/ Reference: Control Data Flexible Disk Drive Hardware Maintenance Manual, pub. no. 75736120, pages 4-5 through 4-8

OBJECTIVE

- Identify operating characteristics of the BR-803 flexible disk drive.

___13-H GENERAL OPERATION

This exercise reinforces your knowledge of BR-803 operations.

Resource

Text/ Exercise: "General Operation," pages 111-112

BLOCK 14: FLEXIBLE DISK DRIVE CONTROLLER

This block introduces you to the FA730 flexible disk drive controller. You study the general characteristics, operation, and functions of the FA730.

BLOCK 14: FLEXIBLE DISK DRIVE CONTROLLER

OBJECTIVE

- Identify the characteristics and operational switches of the FA730.

___14-A FA730 DESCRIPTION AND OPERATION

This activity describes the general characteristics of the FA730.

Resource

Text/ Reference: CDC Flexible Disk Controller FA730A Hardware Reference/Maintenance Manual, pub. no. 96768800, pages 1-1 and 2-2

OBJECTIVE

- Identify the functional areas of the common controller.

___14-B COMMON CONTROLLER

This activity describes the common controller.

Resource

Text/ Reference: CDC Flexible Disk Controller FA730A Hardware Reference/Maintenance Manual, pub. no. 96768800, pages 4-7 through 4-9

OBJECTIVE

- Identify the functional areas of the disk drive interface.

___14-C DISK DRIVE INTERFACE

This activity describes the disk drive interface.

Resource

Text/ Reference	CDC Flexible Disk Controller FA730A Hardware Reference/Maintenance Manual, pub. no. 96768800, page 4-9

OBJECTIVE

- Load and unload a disk from the FA730 system, and perform maintenance checks.

___14-D FLEXIBLE DISK DRIVE SYSTEM LAB

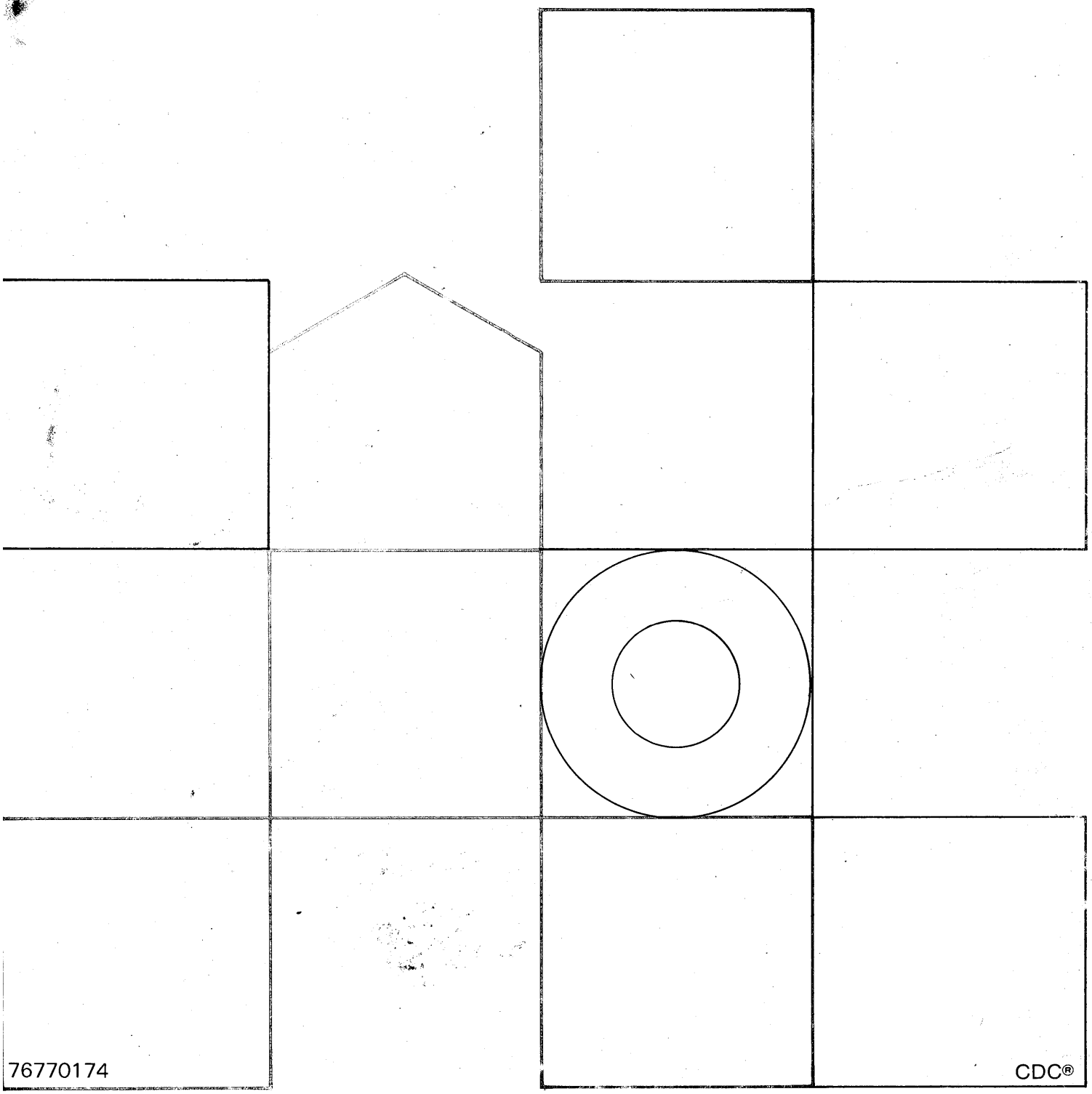
In this activity, you load and unload a flexible disk and perform maintenance checks.

Resource

Lab/ Text	"Flexible Disk Drive System Lab," pages 113-115

___14-E PROGRESS TEST

At this point you should check your understanding by taking this progress test.



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