PLAN OF INSTRUCTION

(Technical Training)

BUIC COMPUTER PROGRAMMING

KEESLER TECHNICAL TRAINING CENTER

24 April 1970

VOLUME 3
of 4 VOLUMES

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DEPARTMENT OF THE AIR FORCE   PLAN OF INSTRUCTION
Hq, 3380th Technical School (ATC)   3AZR27370 D
Keesler Air Force Base, Mississippi 39534   (PDS Code MGW)
Volume 3   24 April 1970

FOREWORD

1. PURPOSE. This volume prescribes the qualitative requirements for Blocks
IV, V, VI and VII of Course 3AZR27370 D, BUIC Computer Programming, in terms
of learning objectives (criterion and enabling) presented in the preferred
teaching sequence, and shows their duration, support materials, and guid-
ance. It was developed under the provisions of ATCR 52-7, Plan of Instruc-
tion, and ATCR 52-33, Instructional System Development.

2. COURSE DESCRIPTION. This course trains Air Force NCOs in the skills and
knowledges needed by them to perform as BUIC III computer programmers. The
course includes computer principles, computer mathematics, basic programming
concepts and techniques, BUIC assembler language programming, and BUIC com-
piler language programming. It also includes analysis of the BUIC III Sys-
tem functional areas of air surveillance, information transfer, weapons,
simulation, recording, control, and ADP/BCDP interface. On-equipment train-
ing includes preparation, assembly, and debugging of assembly and compiler
language programs, adaptation data, and geography; use of simulation tech-
niques to create an artificial environment for system testing; operation of
ADP program for system testing and recording; reduction and analysis of test
results; and use of the utility programs to construct, verify, and maintain
the ADP master tapes.

3. COURSE FORM. Pages iii and iv describe instruction in terms of major
subject areas and time allocation as shown in table III of the course chart.
The six-hour day (360 minutes) includes 300 minutes for instruction in
classroom/laboratory activities and 60 minutes for student administrative
activities such as breaks, clean-up, and class change.

4. EQUIPMENT ALLOWANCES AND AUTHORIZATIONS. With the exception of the
prime training vehicle which is authorized in the PC documents, equipment
required to conduct this course is listed in Equipment Authorization
Inventory Data Number OZRO124. The following TAs apply:

    TA 006 Organizational and Administrative Equipment
    TA 014 Individual Training
    TA 636 Film Library

OPR: Computer Systems Department
DISTRIBUTION: Listed on Page A

5. REFERENCES. This Plan of Instruction is based on COURSE TRAINING STANDARD 3AZR27370 D, 22 December 1969 and COURSE CHART 3AZR27370 D, 21 February 1970.
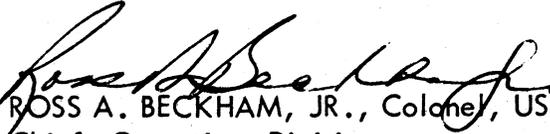
FOR THE COMMANDER

ROSS A. BECKHAM, JR., Colonel, USAF
Chief, Operations Division

		TABLE III – COURSE CONTENT – **COURSE CHART**	3AZR27370 D			

TABLE III – COURSE CONTENT – COURSE CHART   3AZR27370 D

HOURS PER DAY / WEEKS	1	2	3	4	5	6
1	Course Material - UNCLASSIFIED 90 Hours					
	BLOCK I - Programming Principles					
2	Orientation (1 hr); Introduction to computer (5 hrs); Computer mathematics (13 hrs); Boolean logic (5 hrs); Basic problem solving techniques (6 hrs); Flowchart design and analysis (55 hrs); Measurement (5 hrs).					
3						
4	Course Material - UNCLASSIFIED 78 Hours					
	BLOCK II - Central Processor Programming I					
5	Introduction to AN/GSA-51A System (3 hrs); Basic instruction set (29 hrs); Comparison and logical instructions (10 hrs); Introduction to Compool programming (6 hrs); Shift, complex arithmetic, conditional branch, and repeat instructions (24 hrs); Measurement (6 hrs).					
6	Course Material - UNCLASSIFIED 66 Hours					
	BLOCK III - Central Processor Programming II					
7	Field and character search instructions (12 hrs); Mini-BUIC system (15 hrs) Floating point instructions (9 hrs); Special system oriented codes (9 hrs) Subroutines (9 hrs); Interrupt system (6 hrs); Measurement (6 hrs).					
8	Course Material - UNCLASSIFIED 63 Hours					
	BLOCK IV - Input/Output Programming					
9	Introduction (1 hr); Input/output communications (14 hrs); Programming terminal devices (45 hrs); Measurement (3 hrs).					
10	Course Material - SECRET 33 hrs					
	BLOCK V - BUIC System Analysis I					
	Introduction (9 hrs)(S); Air surveillance (21 hrs)(S); Measurement (3 hrs)(U).					
11	Above titles are unclassified					

| TABLE III – COURSE CONTENT – **COURSE CHART** 3AZR27370 D |

HOURS PER DAY WEEK	1	2	3	4	5	6
11	Course Material - SECRET 36 Hours BLOCK VI - BUIC System Analysis II Weapons (18 hrs)(S); Information transfer (11 hrs)(S); Simulation (4 hrs)(U); Measurement (3 hrs)(U). Above titles are unclassified					
12				Course Material - UNCLASSIFIED BLOCK VII - Utility Computer Programs 36 Hrs Introduction (1 hr); Initializing UCP (5 hrs); UCP control and service programs (6 hrs); Tape file maintenance (6 hrs); Assemblers (6 hrs); Adaptation (6 hrs); Utility maintenance system (3 hrs) Measurement (3 hrs).		
13						
14						
15	Course Material - UNCLASSIFIED 90 Hours BLOCK VIII - Program Testing and Analysis Introduction (1 hr); Startover, control, and ADP/BCDP interface (10 hrs); Test planning (11 hrs); BUIC exercise preparation system (BEPS) (16 hrs); Facility system (12 hrs); BUIC analysis and reduction system (BARS) (10 hrs); Master tape generation (6 hrs); Program error correction (12 hrs); Program report processing (6 hrs); Measurement (6 hrs).					
16						
17	Course Material - UNCLASSIFIED 42 Hours BLOCK IX - Compiler Language Techniques Introduction (3 hrs); Coding conventions and program construction (33 hrs); Measurement (4 hrs); Course critique and graduation (2 hrs).					
18						

PLAN OF INSTRUCTION	COURSE TITLE BUIC Computer Programming

BLOCK TITLE	Input/Output Programming

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
	Wk8-Dy1	
1. Introduction. Given a list of computer equipment, select the required primary and secondary equipment plus the proper number of modules of each type as established in the AN/GSA-51A System. A minimum score of at least 70% is required for satisfactory achievement. (CTS para 2a)	1 E	Instructional Materials C175-BUIC-HO, AN/GSA-51A Programming Code Card C176-BUIC-HO, AN/GSA-51A Input/Output Programming Code Card C178-BUIC-HO, AN/GSA-51A Symbolic Coding Sheet C181-BUIC-WB, The Mini-BUIC System C185-BUIC-ST, Programming Manual C191-BUIC-WB, BUIC III Input/Output Programming C193-416M-SU, Register Reference Sheet C1501-416M-SU, AN/GSA-51A Status Code Card C1517-416M-SSG, BUIC III Input/Output Programming TO 31Z3-178-2, NORAD Automated Control Center Facility (I) TO 31Z3-178-18, Programming Manual CCTM 2386A, Part 1, all volumes (I) TM 2780/004, User's Manual for BUIC III Utility Computer Program, Volume 4 (I) ADCBPH 55-71, BUIC III Positional Handbook Common Appendix Equipment and Training Aids Overhead Projector

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PLAN OF INSTRUCTION (Continued)		
LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
		<u>Training Methods</u> L-Ds 1 hr Describe Block IV by time allocation including daily topics, labs, BTV, and examinations. List references to be used and state the importance of each. State that the most importance site references are TOs 31Z3-178-2 and 31Z3-178-18, Handout ST, SWB, and Programming Cards. Develop the AN/GSA-51A System on the chalkboard.
2. Input/Output Communications. Given a flow diagram for an I/O Routine, write a program in assembler language, which will establish the Dlist in a specific location, release a specified I/O Module, transfer required data to a particular location while using specified equipment, and recognize and respond to the various statuses encounted in inprocess or result descriptors. A grade of at least 70% is required for satisfactory achievement. (CTS para 2b,e,h,i,j,k; <u>2c</u>,<u>2d</u>; <u>2g(1)</u>)	14 C (5)	<u>Instructional Materials</u> C175-BUIC-HO, AN/GSA-51A Programming Code Card C176-BUIC-HO, AN/GSA-51A Input/Output Programming Code Card C178-BUIC-HO, AN/GSA-51A Symbolic Coding Sheet C185-BUIC-ST, Programming Manual C181-BUIC-WB, The Mini-BUIC System C191-BUIC-WB, BUIC III Input/Output Programming C193-416M-SU, Register Reference Sheet C1501-416M-SU, AN/GSA-51A Status Code Card C1517-416M-SSG, BUIC III Input/Output Programming TO 31Z3-178-2, NORAD Automated Control Center Facility (I) TO 31Z3-178-18, Programming Manual CGTM 2386A, Part 1, all volumes (I) TM 2780/004, User's Manual for BUIC III

a. Select statements which define the following Electronic Data Processing (EDP) terms as they apply to BUIC III I/O processing:
     (1) Input operation
     (2) Output operation
     (3) IOCU, I/O Module, or controller-comparitor
     (4) Sequential access
     (5) Random access
     (6) Control unit		

PLAN OF INSTRUCTION (Continued)		
LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
(7) Dlist	E	Utility Computer Program, Volume 4 (I) ADCBPH 55-71, BUIC III Positional Handbook Common Appendix
b. Select statements which correspond to the function of the hardware and circuitry involved in the transfer of data between memory and peripheral equipment.	E	Equipment and Training Aids Overhead Projector AN/GSA-51A Computer System (9) 026 Card Punch (2)
c. Select statements which are accurate in regard to operation of the I/O Module in the three modes of operations.	E	Posters (AN/GSA-51A Computer and I/O Modules)
d. Select a statement which defines the purpose of the Dlist.	E	Training Methods L-Ds-Dm 9 hrs, Ds-P 3 hrs, P 2 hrs(3)

e. From a list of descriptive statements, select those which are true in regard to the function and layout of each of the following five descriptor words:
    (1) Setup
    (2) Release
    (3) Command
    (4) Inprocess
    (5) Result
	E	

f. Select or provide correct function and format of the TIO instruction.	E	
g. Given a location in core to be used as the Dlist, code a setup descriptor to establish this location as the beginning of the Dlist; or given a coded (16 digit) setup descriptor, select the location in core that has been established as the beginning of the Dlist.	E	
h. Given a set of conditions, write or select the hardware descriptor sent in response to a setup descriptor.	E	

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PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	3	SUPPORT MATERIALS AND GUIDANCE
	Wk9-Dy1 (6)		
i. Given a coded (16 digit) setup descriptor or the location in core of the beginning of the Dlist and the number of an I/O Module returning an inprocess descriptor, identify the location in core that will receive the inprocess descriptor.	E		
j. Given the number of an I/O Module to release, code a release descriptor to release this I/O Module.	E		
k. Given a set of conditions, select or write the hardware descriptor returned to the Dlist upon receipt of a release descriptor (inprocess/result).	E		
l. Given the amount of data to be transferred, the location in core to receive the data, and the peripheral equipment to be used; select or code a command descriptor to inform the I/O Module of the job to be done.	E		
m. Given the information contained within and format of the inprocess descriptor, correctly select or code an inprocess descriptor.	E		
n. Given the information contained within and the format of the result descriptor, correctly select or code a result descriptor.	E		
o. Given the state of operation of an I/O Module and a TIO instruction to be operated, select or code the I/O Module's response in terms of data transfer and hardware descriptor communication.	E		

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LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
p. Given a flow diagram of a routine to set up one of the two busses, code the routine.	E Wk9-Dy2 (3)	
q. Write and debug a program using the TIO instruction	E	Programming Laboratory Students will go in groups of two or three to operate the laboratory project with the instructor. During all laboratory periods in the block, students will flow, code, punch and submit for assembly or operation the programs assigned to satisfy the requirements of the criterion objectives. After each assembly or operation attempt, the student will analyze the results, correct any errors, and resubmit the program until required specifications are met. When finished with the programs assigned for the present laboratory period, the student will be expected to work toward completing previously assigned projects. Programs will normally be assigned prior to laboratory periods so that students may make maximum use of home study time to flow and code their programs.
3. Programming Terminal Devices a. Given a coded teleprinter routine, analyze and determine the correct function and purpose of individual instructions within it as well as the overall purpose of the	45 (3)	Instructional Materials C175-BUIC-HO, AN/GSA-51A Programming Code Card C176-BUIC-HO, AN/GSA-51A Input/Output Programming Code Card C178-BUIC-HO, AN/GSA-51A Symbolic Coding Sheet

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LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
entire routine, A grade of at least 70% is required for satisfactory achievement. (CTS para 2b,e,h,k) (1) Given a core image and a TIO instruction to be operated, write the line that will be printed. (2) Given a list of physical characteristics, select those which apply to the teleprinter. (3) Select the pushbuttons on the teleprinter necessary to make the teleprinter available to the I/O Module. (4) Identify the output operations that can be accomplished by the teleprinter.	C E E E E	C181-BUIC-WB, The Mini-BUIC System C185-BUIC-ST, Programming Manual C191-BUIC-WB, BUIC III Input/output Programming C193-416M-SU, Register Reference Sheet C1501-416M-SU, AN/GSA-51A Status Code Card C1517-416M-SSG, BUIC III Input/Output Programming TO 31Z3-178-2, NORAD Automated Control Center Facility (I) TO 31Z3-187-18, Programming Manual CGTM 2386A, Part 1, all volumes (I) TM 2780/004, User's Manual for BUIC III Utility Computer Program, Volume 4 (I) ADCBPH 55-71, BUIC III Positional Handbook Common Appendix Equipment and Training Aids AN/GSA-51A Computer System (9) 026 Card Punch (2) Overhead Projector Training Methods L-Ds 25 hrs, Dm-P 14 hrs, P 6 hrs(3) Instructional Guidance Beginning with Wk9-Dy3, Block IV shares each day equally with either Block V or Block VI; therefore, the time accounted for during each day will be only three hours from Wk9-Dy3 to the end of the block.
	Wk9-Dy3 (3)	

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PLAN OF INSTRUCTION (Continued)			
LEARNING OBJECTIVES 1	DURATION (HOURS) 2	3	SUPPORT MATERIALS AND GUIDANCE
b. Given the card reader control unit in a specified mode, a specific number of EAM cards in the hopper, and the area of core to receive the data; code or select a command descriptor to read these cards, select or code the resultant stored core image, and select or code the result descriptor status code. A grade of at least 70% is required for satisfactory acheivement. (CTS para 2b,e,h)	C		
(1) Identify the physical charcteristics of the card reader.	E		Refer to TO 31Z3-178-2 and a transparency of card reader controls.
(2) Identify the two modes of operation of the card reader.	E		
(3) Determine the amount of data contained on the alphanumeric card vs the binary card.	E		
(4) Select or code the possible status codes involved with operation of the card reader.	E		
	Wk9-Dy4 (3)		
c. Given a typewriter-punch-reader (TPR) routine, a TPR in a specified mode, data to input/output on the TPR; code or select a command descriptor to perform the desired operation and recognize the correct status as indicated by the TPR status codes. A grade of at least 70% is required for satisfactory achievement. (CTS para 2b,e,h,k)	C		
(1) Given a list of physical characteristics, select those which apply to the typewriter-punch-reader.	E		

LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
(2) Identify the differences between the binary and alphanumeric modes of operation.	E	

(3) From a list of descriptive statements, select those which are accurate in regard to the following operations of the typewriter-punch-reader operations:
     (a) Output by word count
     (b) Input by record count
     (c) Read by character
     (d) Write by character
	E
	
	E	

(4) Select the definitions of the following typewriter-punch-reader status codes:
     (a) 3∅   (e) ∅4
     (b) ∅1   (f) ∅6
     (c) ∅2   (g) ∅7
     (d) ∅3
	E
	
	Wk9-Dy5
	
	(3)	

d. Given a drum routine, the status of each drum, data to input/output on/from the specified drum or an operation to perform on a specific drum; code or select a command descriptor and a drum control word to perform the desired operation at/from the specified location on the drum and select the correct status of the operation as indicated by the drum status codes. A grade of at least 70% is required for satisfactory achievement. (CTS para 2b,e,h,k)	C	
(1) Given a list of descriptive statements, select those which are true in regard to the: (a) Operating characteristics of the bulk and		Refer to TO 31Z3-178-18.

LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3

bulk/display drums.
      (b) Three types of drum operation.
      (c) Purpose of the drum control word.
	E	

(2) Given a drum operation to be performed at a specific location on a specific drum, select or code the drum control word and the command descriptor to perform the operation.	E Wk10-Dy1 (3)	
(3) Given a drum control word, select the address at which the operation will start and end and the type of operation involved.	E	

(4) Given a list of descriptive statements, select those which define the following drum statuses:
      (a) 3Ø (e) Ø5
      (b) 2Ø (f) Ø6
      (c) Ø3 (g) Ø7
      (d) Ø4
	E	Use C1501, AN/GSA-51A Status Code Card.

(5) Given drum one active and drum two just turned on line; code the drum control words and command descriptors to write ten incoming radar messages on drum two and then transfer (write) these messages to drum one and display them on the on-line position.	E Wk10-Dy2 (3)	Present the problem and assist in coding the control and descriptor words. Show relationship between descriptors and control words.

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PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
(6) Assemble, test, and debug I/O programs.	E	**Programming Laboratory** The students will go to the laboratory in small (2 - 3) groups to assemble and operate their I/O projects while others remain in class. Those remaining in class will work on I/O problems. Two instructors will be needed in the laboratory - one to operate the system and another to assist the students in debugging. A third instructor will be required in class to assist those students remaining there.
	Wk10-Dy3	
	(3)	
f. Given data display consoles (DDC) in specific modes and the requirement to read/display information from/on a particular set of DDCs; code a routine to perform the required read/display operation and respond to the various statuses encountered in inprocess and result descriptors. A grade of at least 70% is required for satisfactory achievement. (CTS para 2b,e,h,k)	C	
(1) From a list of descriptive statements, select those which are true in regard to the operation of the DDC.	E	
(2) Given a list of coded and/or uncoded messages, select or code those four types associated with the DDC.	E	
(3) Given a requirement to read/display information from/on a DDC, code or select a command descriptor to perform the required operation.	E	

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PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
	Wk10-Dy4	
	(1)	

(4) Interpret the following DDC status codes:
    (a) "10" inprocess descriptor
    (b) "30" in the result descriptor
	E	

	(2)	
g. Given the status display console (SDC), the equipment available, and its system assignment or an action taken at the SDC; code or select the message which will light appropriate indicators on the SDC or be received in core from the SDC. A grade of at least 70% is required for satisfactory achievement. (CTS para 2b,e,h,k)	C	
(1) Given a list of physical characteristics, select those which apply to the SDC.	E	
(2) Given a list of coded and uncoded messages, select or code those which are SDC request (input) and display (output) messages.	E	
(3) Given a list of coded and uncoded command descriptors, select or code those which will read/display the SDC.	E	
(4) Given the button depressed on the SDC, code or select the message transferred to core.	E	

(5) Interpret the following SDC statuses:
    (a) 02 (c) 06
    (b) 03 (d) 07
	E	Use C1501 to explain status codes.

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PLAN OF INSTRUCTION (Continued)			

LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3

LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
	Wk10-Dy5	
	(3)	
h. Given a number of tape drives and a magnetic tape operation to perform, code or select a tape control word and a command descriptor to perform this operation. A grade of at least 70% is required for satisfactory achievement. (CTS para 2b,e,h,k)	C	
(1) Given a list of physical characteristics, select those which apply to the magnetic tape drives.	E	Refer to TO 31Z3-178-2.
(2) Given a list of descriptive statements, select those which are true in regard to the method of storing data on magnetic tape.	E	
(3) Given a list of coded and uncoded tape control words, select or code those which will cause a correct tape operation.	E	
(4) Given a list of coded and uncoded command descriptors, select or code those which will cause a correct tape operation.	E	
(5) Given a list of descriptive statements pertaining to the following tape write operations, match each statement to the operation(s) to which it applies: (a) Rewind (b) Test (c) Write EOF (d) Write one record (e) Rewind and lock out (f) Erase		

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LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
(g) Write multi-records	E Wk11-Dy1 (3)	
(6) Given a list of descriptive statements pertaining to the following tape read operations, match each statement to the operation(s) to which it applies: (a) Backspace one record **and read N records** (b) Backspace N records (c) Backspace to EOF (d) Read N records (e) Advance N-1 records and read one record (f) Advance N records (g) Advance to EOF	E Wk11-Dy2 (3)	
(7) Assemble, test, and debug I/O programs.	E Wk11-Dy3	Programming Laboratory The students will go to the laboratory in small groups (2 - 3) to assemble and operate their I/O projects while others remain in class. Those remaining in class will work on I/O problems. Two instructors will be needed in the lab, one to operate the system and another to assist the students in debugging. A third instructor will be required to assist those students remaining in class.

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LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
	(3)	
(8) Given a description or an example of a tape record format and a list of the types of tape records, identify the type of record which fits the description or example. E		Refer to C191 for tape formats.

(9) Interpret the following tape status codes:
    (a) Ø1 (e) Ø5
    (b) Ø2 (f) Ø6
    (c) Ø3 (g) Ø7
    (d) Ø4   E
		Refer to C1501 for tape status codes.

	Wk11-Dy4	
	(3)	
(10) Given a routine to read and write magnetic tape, code the routine in assembler language. E		
	Wk11-Dy5	
	(2)	
k. Given the message processor, an operation to perform, the type message input to or output from the message processor, and an external request; code the command descriptor required to perform the operation. A grade of at least 70% is required for satisfactory achievement. (CTS para 2b,e,h,k) C		
(1) Given a list of physical characteristics, select those which apply to the message processor. E		
(2) Given a list of coded and uncoded messages, select or code those appropriate to the message processor. E		

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PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
(3) From a list of descriptive statements, select those which are true in regard to the functions of the five external requests.	E	
(4) Interpret the following message processor statuses: (a) Ø2 (c) Ø6 (b) Ø3 (d) Ø7	E	Refer to the C1501 for message processor statuses.
(5) Given an operation to perform on the message processor, code or select a command descriptor to perform that function.	E	
	(1)	
1. Given the simulator group and an operation to be performed, code or select the message to be transferred and the descriptors involved in the operation. A grade of at least 70% is required for satisfactory achievement. (CTS para 2b,e; h, k)	C	
(1) From a list of descriptive statements, select those which are true in regard to the function and operating characteristics of the simulator group.	E	Refer to page 4-89, TO 31Z3-178-18.
(2) Given a list of coded and uncoded messages, select or code those appropriate to the simulator group.	E	
	Wk12-Dy1	
	(3)	
(3) Assemble, test, and debug I/O programs.	E	Programming Laboratory The students will go to the laboratory in small groups (2 - 3) to assemble and operate

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LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
		their I/O projects while other students remain in class. Those remaining in class will work on I/O problems. Two instructors will be needed in the laboratory; one to operate the system and another to assist the students in debugging. A third instructor will be required to assist those students remaining in class.
	Wk12-Dy2	
4. Measurement	3	Instructional Materials
		ATCR 52-3, Measurement (I)
		ATCM 50-4, Grading Practices (I)
		TSM 52-1, Chapter 8, Training Doctrine Manual (I)
		C175-BUIC-HO, AN/GSA-51A Programming Code Card
		C176-BUIC-HO, AN/GSA-51A Input/Output Programming Code Card
		C178-BUIC-HO, AN/GSA-51A Symbolic Coding Sheet
		C185-BUIC-ST, Programming Manual
		C193-416M-SU, Register Reference Sheet
		C1501-416M-SU, AN/GSA-51A Status Code Card
		C1517-416M-SSG, BUIC III Input/Output Programming
		Training Methods
		TP $2\frac{1}{2}$ hrs, Ds $\frac{1}{2}$ hr

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PLAN OF INSTRUCTION (Continued)		
LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
a. Examination	$(2\frac{1}{2})$	
b. Critique	$(\frac{1}{2})$	

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BLOCK TITLE BUIC Systems Analysis I

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
	Wk9-Dy3	
1. Introduction	9	**Instructional Materials**
		C182-BUIC-ST, BUIC III Systems Analysis
		C186-BUIC-WB, BUIC Systems Analysis
		C194-BUIC-CD, Operator Task Analysis
		ADCBPH 55-68, Manual Input Operator
		ADCBPH 55-71, Common Appendix
		TM 2385/108, Displays
		TM 2385/109, Switch Actions
		TM 2385/101, General
		TM 2385/Part I Specifications, All Volumes (I)
		TM 2385/Part II Specifications, All Volumes (I)
		TM 3000/401, SID Self-Instructional Text (I)
		TM 3000/402, TD Self-Instructional Text (I)
		TM 3154, Version Descriptions, All Volumes (I)
		Equipment and Training Aids
		Overhead Projector
		Data Display Console (2)
		026 Card Punch (2)
		Training Methods
		Ds-Dm 6 hrs, P 3 hrs(2)

PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
	(3)	<u>Instructional Guidance</u> NOTE: This block shares the 6 hour instructional day equally with Block IV; therefore, only three hours are accounted for in column 2 for each day. Using TM 2385A, Volumes 108 and 201 as examples, point out the purpose, general format, and contents of these documents. Use ADCBPH 55-68 in the same manner.

a.   Given a list of descriptive statements, select those which are true in regard to:

    (1) The contents and purpose of the Contractor End Item (CEI) TM 2385A Part I and Part II specifications and the Air Defense Command BUIC Positional Handbooks.

    (2) How the BUIC III System interfaces operationally with SAGE and associated air defense agencies.

    (3) The air defense responsibility of a BUIC NORAD Control Center (NCC).

    (4) Identity and primary responsibilties of the BUIC III personnel teams.

    (5) Interrelationship of the four BUIC III Master Programs:

        (a) BUIC Confidence-Diagnostic Computer Program (BCDP).

        (b) Utility Computer Program (UCP).

        (c) System Exercise Computer Program (SEP).

        (d) Air Defense Computer Program (ADP).

    (6) The definitions to the following Air Defense Program (ADP) terms:

        (a) Computer Program Components

        (b) Cyclic Programs

        (c) Sequence Parameters

        (d) Control Program

LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
(e) Conditional Cyclic Programs (f) ADP Start Deck (CTS para 3a,b,c; 3f(1),(4))	E Wk9-Dy4 Wk9-Dy5 (6)	
b. Given ADCBPH 55-68 and a set of specifications, select or code an appropriate manual input message that will be accepted by ADP. (CTS para 3a,c; 3f(1),(3))	E	Explain how manual inputs are used to provide ADP with control information of the site's air defense function. Refer students to ADC BPH 55-68 and show a transparency of console function assignment message. Allow the class to code a Manual Input Message in class.
(1) Identify the function of Manual Inputs in ADC.	E	
(2) Identify the document used to code Manual Inputs.	E	

(3) Code the following Manual Input Messages that are contained in the initial environmental condition of the Air Defense Program:
       (a) Console Function message
       (b) Data and Time message
	E	

c. Select from a list of descriptive statements those statements which:
     (1) Name the types of displays available at a DDC.
     (2) Identify the types of situation displays.
     (3) Identify the types of tabular displays.
     (4) Define the terms:
       (a) Forced Displays
       (b) Requested Displays
     (5) Name the documents used to interpret displays.
     (6) Are true in regard to how displays are routed in BUIC III.
		Discuss each type of display available and have the students look at them in the text and in ADCBPH 55-71.
		
		Take students to the display laboratory and demonstrate the function of the SIDs, TDs, and various console switches.

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LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
(7) Identify the functions of the group categories. (CTS para 3d)	E Wk10-Dy1 Wk10-Dy2	
2. Air Surveillance	21	**Instructional Materials** C182-BUIC-ST, BUIC III Systems Analysis C186-BUIC-WB, BUIC Systems Analysis C194-BUIC-CD, Operator Task Analysis ADCBPH 55-64, RICMO/ASO, AST (I) ADCBPH 55-65, Air Surveillance Operator (I) ADCBPH 55-67, Identification Operator (I) ADCBPH 55-68, Manual Inputs Operator ADCBPH 55-71, Common Appendix TM 2385/108, Displays TM 2385/109, Switch Actions TM 2385/Part I Specifications, All Volumes (I) TM 2385/Part II Specifications, All Volumes (I) **Equipment and Training Aids** Overhead Projector AN/GSA-51A Computer System (9) 026 Card Punch (2) **Training Methods** Ds-Dm 16 hrs, P 5 hrs(3) **Instructional Guidance**
	(2)	

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PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
a. Radar Inputs (Radar Preprocessing Program, RAP) (CTS para 3a,b,c,d; 3e(1); 3f(1),(2),(3),(4))		
(1) Identify the sources of radar inputs.	E	
(2) Given a list of descriptive statements, select those which are true in regard to the: (a) Types of data processed by Long Range Radar Data Processors (AN/FST-2). (b) Message label recognition process of RAP. (c) Purpose and effects of the radar set status switch actions. (d) Quantity analysis function of RAP. (e) Displays associated with radar inputs: 1 Deficient Data Attention TD 2 Excess Data Attention TD 3 Radar Count Summary TD 4 Radar Site Load TD	E	Refer students to ADCBPH 55-71 and point out the displays that are available to the RICMO/ ASO. Provide time for the class to interpret displays.
(3) Using ADCBPH 55-68 and given information needed to code a radar channel assignment message, code a radar channel assignment message that will be accepted by the computer when it is cycling ADP.	E	
(4) Given a list of descriptive statements, select those which are true in regard to the cause and correction of the registration and collimation errors in radar positioning.	E	
(5) Given a list of descriptive statements, select those which are true in regard to the cause and purpose of the displays associated with radar inputs.	E	
	(2)	

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LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
b. Radar Correlation Program (RAC). (CTS para 3c; 3e(1); 3f(1),(2),(4)). Given a list of descriptive statements, select those which are true in regard to: (1) The process and purpose of coordinate conversion and transformation. (2) The definition of <u>correlation</u>. (3) SAGE and ASTS (Advanced SAGE Tracking Scheme) correlation logic. (4) Utilization of search area checks by program RAC. E c. Active Tracking (TRK). (CTS para 3a,b,c,d; 3e(1); 3f(1),(3),(4)). (1) Given a list of descriptive statements, select those which are true in regard to: (a) The definition of <u>Position Smoothing</u>, <u>Velocity Smoothing</u>, and <u>Prediction</u>. (b) The names and order of priority of data selection logic. (c) Where the symbols for the categories of data selection logic are displayed. (d) How the smoothing function uses data selection, large search area, and small search area for calculation of a new track position. (e) How track merit is maintained and where it is display to the operator. (f) The ways that a track may be entered into the BUIC III NCC System. E	(2) Wk10-Dy3 (1)	

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LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3

(2) From a list of descriptive statements, select those which are accurate in regard to the:
    (a) Displays associated with the active tracking functions:
        <u>1</u> Friendly Track SID
        <u>2</u> Hostile Track SID
        <u>3</u> Interceptor Track SID
        <u>4</u> Backtold Track Moved Attention SID
        <u>5</u> Tracking Trouble Attention SID
    (b) Purpose of the displays associated with active tracking.
 	
    (c) Steps required to take specified active tracking switch actions.
 	
    (d) Purpose and effect of specified active tracking switch actions.
 	
    (3) Using ADCBPH 55-68, code a Track Data Manual Input message that will be accepted by the computer when cycling ADP.
 	
    d. Passive Tracking (TRK). (CTS para 3a,b,c,d; 3e(1); 3f(1),(3),(4))
 	
    (1) Given a list of descriptive statements, select those which are true in regard to:
    (a) The definition of <u>Passive Tracking</u>.
    (b) The definition of track classifications associated with passive tracking:
        <u>1</u> Passive Track
        <u>2</u> Active Track
        <u>3</u> Jammer Track/Raid
	E
	
	E
	
	E
	
	(2)
		Have the students open their texts to the related displays. Discuss each of the actions and tell when they are used. Allow the class time to interpret the displays.
		
		Have students refer to TM 2385/108 for the following switch actions:
		1. Initiate
		2. Reinstate
		3. Exchange
		4. Extrapolate
		5. Accept
		6. Drop

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LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
4 Nonjammer Track/Raid (c) Strobe radar display characteristics. (d) The definition of Ghost, Strobe, Jammer Track, and Jammer Raid. (e) How the active/passive data selection logic utilizes active and passive data. (f) The categories of confirmation score. (g) How strobe data is processed by the Semi-Automatic Threshold Control Unit and by the AN/FST-2. (h) Steps required to take specified passive track switch actions. (i) Purpose and effect of specified passive tracking switch actions. (2) Using ADCBPH 55-68, code a lateraltell selection for a strobe manual input message.	E E Wk10-Dy4 (3)	Have students refer to ADCBPH 55-71 for the following passive tracking switch actions: 1. Initiate Jammer Track/Raid 2. Reinitiate Jammer Track/Raid 3. Score Confirmed 4. Score Suspected Ghost 5. Select Active/Passive 6. Select Passive Only 7. Lateraltell Strobe On/Off
e. Height Input/Output Program (HIO). (CTS para 3a,b,c,d; 3e(1); 3f(1),(2),(3),(4)) (1) Given a list of descriptive statements, select those which are true in regard to the: (a) Applications of height information within the NCC by: 1 Identification		

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LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3

          2 Weapons
          3 Passive Tracking
          4 Simulation
      (b) Duties of the personnel (Air Surveillance Operator and Height Range Indicator Operator) responsible for the height function.
      (c) Types, numbers, and location of NCC height data inputs:
          1 Long Range Radars (LRRs)
          2 Airborne Long Range Radars (ALRRs)
          3 Pilot reported inputs
      (d) Data link and voice methods of height data transmission.
      (e) Purposes and results of the switch actions associated with the Air Surveillance operator (ASOper) height (HT) function.
      (f) General function of ASOper (HT) data display console and the HRIop (Height Range Indicator operator) equipment used in the height section.
      (g) Accuracy tolerance of height finders (HFs).
      (h) Normal, Standby, and Override modes of semi-automatic height finder operation.
      (i) Manual Mode of height finder operation.
      (j) Off Mode of height finder operation.

E

Wk10-Dy5

(3)

      (2) Given a list of descriptive statements, select those which are true in regard to the:
      (a) Priority system for automatic height requests in terms of eligibility restrictions, priority requirements, and selection frequency.

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LEARNING OBJECTIVES 1	DURATION (HOURS) 2	3	SUPPORT MATERIALS AND GUIDANCE

(b) Program initiated height requests:
    1 Standard
    2 Special
    3 Dummy
    4 Lateral-told-out
(c) Following operator initiated height requests:
    1 Radar Height Request
    2 Lateral-told Height Request
    3 Lateral-told-in Height Request
    4 Simulated Height Request
(d) Meaning and reasons for the Positive, Negative, Aborted, and No Action reply messages.
	E
	
	Wk11-Dy1
	Wk11-Dy2
	
	(6)		

    f. Identification Program (BID). (CTS para 3a,b,c; 3e(1); 3f(1),(2),(3),(4))

    (1) Given a list of descriptive statements, select those which are true in regard to the:
      (a) NORAD/CONAD requirements for identification during normal readiness and maximum readiness.
      (b) Primary function of the identification section in the NCC for identification, monitoring, and coordination of all tracks within the NCC's area of responsibility.
      (c) Purposes and results of the switch actions associated with the Identification Operator (IDOper) function.
      (d) Definitions of the following track identities:
        1 ARP (W)
        2 Bee (B)
        3 Bomarc (D)

LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3

<table>
<tr><td>

4 Faker (K)
5 Friendly (F)
6 Hostile (H)
7 Interceptor (Cor T)
8 Pending (P)
9 Round Robin (R)
10 Special (S)
11 Unknown (U)
12 Yoke (Y)

(e) Track identification categories into which all tracks are classified: Friendly, Hostile, and Interceptor.

(f) Concept of Air Defense Identification Zones.

(g) Sources of air movement information (Flight Plans):

1 FAA (Federal Aviation Administration)
2 AMIS (Air Movement Information Section)
3 DOT (Department of Transport - Canadian)

(h) Primary methods of identification:

1 Flight Plan Correlation
2 MK X SIF Correlation
3 Identification by origin (IDBO)
4 VALID
5 Visual Identification
6 CAT tracks

(i) Displays associated with the IDOper function.

(2) Using ADCBPH 55-68, code a Flight Plan Data Message that will be accepted by the computer when ADP is cycling.
</td><td>

E

E
</td><td>

Refer students to ADCBPH 55-68 and explain the format of the message.

Demonstrate at the data display console all of the displays and switch actions discussed in this block.
</td></tr>
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LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
	Wk11-Dy3	
3. Measurement	3	Instructional Materials
		C182-BUIC-ST, BUIC III Systems Analysis
		C194-BUIC-CD, Operator Task Analysis
		ADCBPH 55-68, Manual Inputs Operator
		ADCBPH 55-71, Common Appendix
		TM 2385/108, Displays
		TM 2385/109, Switch Actions
		ATCR 52-3, Measurement (I)
		ATCM 50-4, Grading Practices (I)
		TSM 52-1, Chapter 8, Training Doctrine Manual (I)
		Training Methods
		Ds 1 hr, TP 2 hrs(2)
	(2)	
a. Examination		
	(1)	
b. Critique		

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PLAN OF INSTRUCTION	COURSE TITLE	BUIC Computer Programming

BLOCK TITLE BUIC System Analysis II

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
	Wk11-Dy4	
1. Weapons	18	**Instructional Materials** C182-BUIC-ST, BUIC III System Analysis C186-BUIC-WB, BUIC System Analysis C194-BUIC-CD, Operator Task Analysis ADCBPH 55-61, Senior Director (I) ADCBPH 55-62, Weapons Director (I) ADCBPH 55-63, Air Defense Artillery Director (I) ADCBPH 55-66, Target Monitor (I) ADCBPH 55-68, Manual Inputs Operator ADCBPH 55-71, Common Appendix TM 2385/108, Displays TM 2385/109, Switch Actions TM 2385/107, Variable Display Equipment (I) TM 3000/401, SID Self Instructional Text (I) TM 3000/402, TD Self Instructional Text (I) TM 3154, Version Description, All Volumes (I) TM 3000/205/01, Weapons, BUIC III SETE (I) **Equipment and Training Aids** Overhead Projector AN/GSA-51A Computer System (9) **Training Methods** Ds-Dm 12 hrs, P 6 hrs(3)

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PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
	(1)	**Instructional Guidance**
a. Weapons Types and Statuses (CTS para 3a,c,d; 3e(3); 3f(3),(4))		NOTE: This block shares the 6 hour instructional day equally with Block IV from Wk11-Dy 4 through Wk12-Dy2, and with Block VII from Wk12-Dy3 through Wk13-Dy5; therefore, only three hours are accounted for in column 2 for each day.
(1) Given a list of descriptive statements, select those which are true in regard to: (a) The names of the weapons used by BUIC III in its air defense function. (b) How weapons statuses are used in air defense. (c) The difference between and content of stored weapons parameters and variable weapons status. (d) Interpretation of Airbase SID, Bomarc Missile SID, and Interceptor SID. (e) Interpretation of the Manned Interceptor Weapons Availability TD, Missile Weapons Availability TD, and ADA Alert Summary TD.	E	Using the students' past experience in air defense, discuss the weapons presently used in the BUIC III air defense system. For each aircraft discussed, list its possible configurations and capabilities on the chalkboard.
(2) Using ADCBPH 55-68, code Weapons Status and Bomarc Status messages.	E	
	(1)	
b. Track Assignment (CTS para 3c,d; 3e(3); 3f(1),(3))		
(1) From a list of descriptive statements, select those which are true in regard to: (a) Interpretation of the HUKP (Hostile, Unknown,		

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LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3

Faker, Pending Track SID.
      (b) The steps required to assign a track to a
Weapons Director.
      (c) Interpretation of the following tabular dis-
plays:
          1 Unassigned Track
          2 Track Assignment
          3 WD Assignment Summary
      (d) The cause and purpose of each of the following
tabular displays:
          1 Unassigned Track
          2 Track Assignment
          3 WD Assignment Summary
 	
      (2) Using ADCBPH 55-68, code a Bomarc Line Test
Message and a Bomarc Prelaunch Status Test Message.
 	
   c. Weapons Commitment (CTS para 3a,b,c,d; 3e(3); 3f(4)).
From a list of descriptive statements, select those which are
accurate in regard to the:
      (1) Definition of the three types of manned inter-
cepter missions:
          (a) Interception
          (b) Combat Air Patrol (CAP)
          (c) Return-to-Base (RTB)
      (2) Steps required to commit a manned interceptor.
      (3) Interpretation of the following displays:
          (a) Scramble Track SID
          (b) Scramble TD
      (4) Steps required to commit a Bomarc.
      (5) Interpretation of the following displays:
          (a) Bomarc Precommit SID
	E
	
	E
	
	(1)	

LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3

(b) Bomarc Commitment Canceled SID
    (6) Cause and purpose of each display associated with weapons commitment.
	E
	
	Wk11-Dy5
	Wk12-Dy1
	
	    (6)	

d. Manned Interceptor Guidance (CTS para 3e(3); 3f(1), (2),(4)). Given a set of descriptive statements, select those which are accurate in regard to the:
    (1) Definition of the components of an intercept mission (Profile and Tactic).
    (2) Co-Altitude, Low Altitude, and Snap-Up attack types.
    (3) Features of each profile.
    (4) Features of each attack option.
    (5) Initial Scramble, Scramble, Climb, Midcourse, Transition, Combat, and Frozen phases of an intercept mission.
	E	

e. Manned Interceptor Missions (CTS para 3c,d; 3e(3); 3f(1),(3),(4)). From a list of descriptive statements, select those which are true in regard to the:
    (1) Interpretation of the following displays:
        (a) Interception Location SID
        (b) Manned Interceptor Offset SID
        (c) Manned Interceptor Intercept Mission TD
        (d) Manned Interceptor on CAP or RTB TD
        (e) No Action Results TD
    (2) Cause and purpose of each display associated with manned interceptor missions.
    (3) Mission monitoring function of the weapons program in relation to the miss distance check.
		At completion of this lesson, take students to the laboratory and demonstrate the actions required at the display console to commit an interceptor to an assigned track. Demonstrate the use and content of the displays associated with an intercept mission.

PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3

(4) Interpretation of interceptor attention displays that can occur during an intercept mission.
(5) Type of data transmitted by Close Control and by Modified Close Control.
(6) Use of TDDL (Time Division Data Link) as the primary means of weapons communications.
(7) Steps required to take the following switch actions:
    (a) Commit-Manned Interceptor for Interception
    (b) Recommit-Manned Interceptor to CAP
    (c) Recommit-Manned Interceptor to RTB
	E
	
	Wk12-Dy2
	
	(3)	

f. Bomarc Guidance (CTS para 3c,d; 3e(3); 3f(1),(2),(3)). Given a list of descriptive statements, select those which are accurate in regard to the:
    (1) Definition of Bomarc Profiles 1, 2, and 3.
    (2) Use of Cutoff and Final Turn tactics.
    (3) Name and basic function of each of the seven phases of a Bomarc mission.
    (4) Conditions that will cause a Bomarc to be placed on a CAP mission and on a de-paired intercept mission.
    (5) Interpretation of the Bomarc Intercept Point SID and the Bomarc on Interception or CAP Mission TD
	E
	
	Wk12-Dy3
	Wk12-Dy4
	
	(6)	

g. Air Defense Artillery (ADA) (CTS para 3a,b,c,d;		

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LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3

3e(3); 3f(1),(3)). From a set of descriptive statements, select those which are accurate in regard to the:

(1) Functions of the Air Defense Artillery Director (ADAD).

(2) Capabilities of the Missile Master and BIRDIE-5 types of Army Air Defense Command Posts (AADCP).

(3) Location of the ADA areas: A Ring, Early Warning Area, Active Area, Defended Area, and D Ring.

(4) Definition of the ADA categories of Non-ADA, Early Warning, and Active ADA tracks.

(5) Definition of the Priority 1, Pass Track, Hold Fire, Cease Fire, and Release ADAD actions.

(6) Definition of the Request for Dump, Periodic Status, and Pop-Up Replyback messages that are transmitted from the AADCP to the NCC.

(7) Definition of the Out of Action, Ready, Tracking, Firing, Kill, Effective, and Ineffective types of fire unit status that can be received by the ADAD from the AADCP.

(8) Interpretation of the ADA AADCP SID and the ADA Channel Assignment TD.

E

h. Positive Target Control (CTS para 3a,b,c,d; 3e(3); 3f(1),(2),(3)). From a list of descriptive statements, select those which are true in regard to the:

(1) Functions of Positive Target Control.

(2) Function of the Exercise Director and Target Monitor (TM) positions of the Target Monitoring Team.

(3) Actions required to start Positive Target Control (PTC).

(4) Interpretation of the Exercise Track SID, Air Movement Data SID, and Air Movement Data TD.

(5) Identification of the following as examples of unsafe track behavior:

(a) Loss of exercise track radar data

At completion of this lesson, take students to the laboratory and demonstrate actions that are taken at the display console in the Bomarc ADA, and PTC functional positions. Demonstrate use and content of the displays associated with Bomarc ADA and DTC.

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LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3

LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
(b) Failure to maintain separation distance (c) Presence of aircraft without tracks in the intercept area (d) Loss of radio contact between the interceptor and the control facility (e) Conflicting flight plans (f) Aircraft transponding the unsafe SID code (6) Function of the Drop and Stop PTC switch actions in terminating an exercise.	E Wk12-Dy5	
2. Information Transfer	11	Instructional Materials C182-BUIC-ST, BUIC III System Analysis C186-BUIC-WB, BUIC System Analysis C194-BUIC-CD, Operator Task Analysis ADCBPH 55-61, Senior Director (I) ADCBPH 55-62, Weapons Director (I) ADCBPH 55-71, Common Appendix TM 2385/104, Information Transfer (I) TM 3000/204/01, BUIC III SETE (I) Equipment and Training Aids Overhead Projector Training Methods Ds-Dm 11 hrs Instructional Guidance
	(2)	
a. Introduction (CTS para 3a,b,c,d; 3e(2); 3f(1)). From a list of descriptive statements, select those which are		

PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3

accurate in regard to:
    (1) The definitions of the following terms associated with information transfer:
        (a) Backtell
        (b) Lateraltell
        (c) Forwardtell
        (d) Control Facility
        (e) Lateraltell/Forwardtell Control Facility
        (f) Associate
        (g) Adjacent
        (h) Tied
        (i) Weapons Controller
    (2) The information transfer responsibilities of the following BUIC NCC personnel:
        (a) Senior Director
        (b) Weapons Director
        (c) Air Surveillance Officer (RICMO/ASO)
        (d) Air Surveillance Operator (ASOper)
        (e) Air Defense Artillery Director (ADAD)
        (f) Target Monitor (TgM)
    (3) Assignment of digital input and output channels.
    (4) Equipment identification and addressing.
    (5) Message types
 	
   b. Backtell (CTS para 3a,b,c,d; 3e(2); 3f(1),(3),(4)). From a list of descriptive statements, select those which are true in regard to:
    (1) How a BUIC III NCC processes backtell inputs from the parent DC.
    (2) Interpretation of the following backtell SIDs and TDs:
        (a) Backtell Track Moved Attention Display
	E
	
	(1)
		Use the flows on backtell in the text to lead a discussion on this subject.
		
		Assign workbook problems on displays. Refer to ADCBPH 55-71 for additional information.

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
(b) Operational Status TS (c) No-Updating Information for Two Minutes Attention Display (d) Backtold Not Accepted Display (e) Bomarc Backtell Attention Display (3) The cause and purpose of each display associated with backtell. c. Transition from Monitor Mode to Active Mode (CTS para 3c; 3e(2); 3f(1)). Given a list of descriptive statements, select those which are accurate in respect to: (1) The action taken on backtold track. (2) The BUIC III takeover of operational responsibility. (3) How lines of communication between the various elements in the air defense system and the NCC are established. d. Lateraltell (CTS para 3a,b,c,d; 3e(2); 3f(1),(2)). From a list of descriptive statements, select those which are true in regard to: (1) Definition of lateraltell. (2) The step by step actions taken to complete an external handover. (3) The definition of <u>Interception Purpose Lateraltell</u>, <u>ADA Purpose Lateraltell</u>, and <u>Exchange Purpose Later-</u>	E Wk13-Dy1 ($\frac{1}{2}$) ($\frac{1}{2}$) E (2)	Complete objective 2b. Use the text to show the steps that must be taken to arrange communication lines. List the actions taken by the Senior Director to change BUIC III NCC operational modes. Refer to ADCBPH 55-61 for additional information.

PLAN OF INSTRUCTION (Continued)			

PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3

<u>altell.</u>
 	
     (4) How tape generated data trails are suppressed.
     (5) The function of the Interceptor Data Link Relay.
     (6) How route status is monitored.
     (7) The interpretation of the following lateraltell
SIDs and TDs:
         (a) Handover Imminent/Completed Attention Display
         (b) Lateraltold-In for Tracking Display
         (c) Handover Imminent Display
     (8) The cause and purpose of the displays associated
with lateraltell.
 	
    e. Forwardtell (CTS para 3a,b,c,d; 3e(2); 3f(1),(2)).
From a set of descriptive statements, select those which are
accurate in respect to the identity and flow of the forward-
tell data transferred from the NCC to the CC:
     (1) Track data
     (2) Summary data:
         (a) Division Air Situation Summary data:
            <u>1</u> Status information
            <u>2</u> Track counts
            <u>3</u> Commitment counts
             <u>4</u> Object counts
             <u>5</u> Kill counts
         (b) Manned Interceptor Squadron Summary data
         (c) Bomarc Squadron Summary data
	E
	
	Wk1 3-Dy2
	
	(2)
	
	(1)
		
		Complete objective 2d.

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
(d) AADCP Summary data	E	
	Wk13-Dy3 Wk13-Dy4	
	(1)	Complete objective 2e.
	(1)	
f. Control Mechanism (CTS para 3a,c; 3e(2); 3f(1)). Given a list of descriptive statements, select those statements which are true in regard to the following information transfer function controls: (1) Output Priority Scheme (2) Duplicate Track Number Check (3) Track Position Check (4) Track Channel Assignment for Told-In Tracks (5) Termination Procedures (6) Simulation Telling	E	
3. Simulation. From a list of descriptive statements, select those which are accurate in regard to the: a. Purposes of BUIC III Real Time Simulation: (1) System exercising for training and evaluation (SETE) (2) Assembly testing for system checkout b. Name and function of the following elements of SETE which are not a part of the Air Defense Program (ADP): (1) BUIC Exercise Preparation System (BEPS) (2) BUIC Analysis and Reduction System (BARS) c. Name and responsibilities of the Real-Time Simulation team:	4	Instructional Materials C182-BUIC-ST, BUIC III System Analysis C186-BUIC-WB, BUIC System Analysis C194-BUIC-CD, Operator Task Analysis ADCBPH 55-62, Weapons Director Handbook (I) ADCBPH 55-68, Manual Inputs Handbook ADCBPH 55-69, Simulation Handbook (I) ADCBPH 55-71, Common Appendix TM 2385/105, Startover, Control, Recording, and Real-Time Simulation (I)

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LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
(1) Simulation Supervisor (Sim Sup) (2) Interceptor Pilot Supervisor (IPS) (3) Flight Path Simulator (FPS) d. Actions required to start simulation e. Conditions that will terminate the simulation function: (1) Startup occurs (2) STOP SIM switch action (3) Bomarc AUTHORIZED switch action f. Definition of Simulation Reference Number (SRN) g. Capabilities listed below that become automatically available after the Start Simulation action is taken: (1) The ability to control and generate internally simulated radar. (2) Automatic umpire function (3) Control over input of information from the exercise tape. (4) Height and ECM information (5) Data associated. h. Features that are not available at the start of simulation unless they are indicated otherwise by the insertion of the Operational Conditions for Simulation (OCS) Manual Inputs cards. (1) Bomarc Simulation (2) Air Defense Artillery Simulation (3) ID Response Simulation (4) Automatic Crosstalk (5) Debriefing Printouts (CTS para 3a; 3d; 3b; 3e(4); 3f(1),(4))	E Wk13-Dy5	Equipment and Training Aids Overhead Projector AN/GSA-51A Computer System (9) Training Methods Ds-Dm 4 hrs Instructional Guidance Use a transparency to indicate the positions of the Sim team in the operations room. At completion of the lesson, take students to the laboratory and demonstrate the actions required at the consoles for simulation functions. Demonstrate use and content of displays associated with information transfer and simulation functions.
4. Measurement	3	Instructional Materials C182-BUIC-ST, BUIC III System Analysis C194-BUIC-CD, Operator Task Analysis

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PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
		ADCBPH 55-68, Manual Inputs Operator
		ADCBPH 55-71, Common Appendix
		TM 2385/108, Displays
		TM 2385/109, Switch Actions
		ATCR 52-3, Measurement (I)
		ATCM 50-4, Grading Practices (I)
		TSM 52-1, Chapter 8, Training Doctrine Manual (I)
		<u>Training Methods</u>
		Ds 1 hr, TW 2 hrs
a. Examination	(2)	
b. Critique	(1)	

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PLAN OF INSTRUCTION	COURSE TITLE	BUIC Computer Programming

BLOCK TITLE	Utility Computer Programs

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
	Wk12-Dy3 Wk12-Dy4	
1. Introduction. Define the duties and responsibilities of the operational program maintenance team (OPM). (CTS para 3b).	1 E	**Instructional Materials** C192-BUIC-WB, Program Maintenance and Testing **Equipment and Training Aids** Overhead Projector **Training Methods** L 1 hr **Instructional Guidance** NOTE: Training in this block is on a 3-hour a day schedule from Wk12-Dy3 through Wk13-Dy5. Show transparency of ADCR 55-42.
2. Initializing UCP. Given a list of steps, procedures, switch positions, and sequences of operation; manually load and initiate the operation of CUE program. (CTS para 4b)	5 C	**Instructional Materials** C192-BUIC-WB, Program Maintenance and Testing C176-BUIC-HO, AN/GSA-51A Input/Output Pro- gramming Code Card TM 2780/001, User's Manual for BUIC III Utility Computer Program, Vol 1 **Equipment and Training Aids** Overhead Projector **Training Methods** L-Dm 2 hrs, P 3 hrs(3)

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PLAN OF INSTRUCTION (Continued)		
LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
	Wk12-Dy5 Wk13-Dy1	

3. UCP Control and Service Programs. Given a list of control inputs to CUE file programs; code, punch, and load inputs to initiate the operation of specifically listed utility programs (CTS para 2i; 4a,b).	6
	
	C
		Instructional Materials
		C192-BUIC-WB, Program Maintenance and Testing
		TM 2780/001, User's Manual for BUIC III
		  Utility Computer Program, Vol 1
		TM 2780/002, User's Manual for BUIC III
		  Utility Computer Program, Vol 2

a. From a list of descriptive statements, select those which are accurate in regard to the function of the programs in UCP file one (CUE file):
        (1) SMT
        (2) CMT
        (3) CUE
        (4) CIP
        (5) UCC
        (6) Service programs
	
	E
		Equipment and Training Aids
		Overhead Projector
		026 Card Punch (2)
		AN/GSA-51A Computer System (9)
		
		Training Methods
		Ds-Dm 4 hrs, P 2 hrs(3)

b. From a list of statements, select those which are accurate in regard to:
        (1) The interaction between CUE file programs during the operation of the UCP system.
        (2) Information stored in the program environment (PEN) table.
        (3) Information on the control cards that initiate the operation of the service functions.
	
	E	

	Wk13-Dy2 Wk13-Dy3	
4. Tape File Maintenance. Given a list of programs and control inputs to TFM programs; code, punch, and load inputs to TFM to initiate the operation of TFM programs and CUE service routines. (CTS para 4a,b; 4c).	6 C	Instructional Materials C192-BUIC-WB, Program Maintenance and Testing TM 2780/001, User's Manual for BUIC III Utility Computer Program, Vol 1

PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
		TM 2780/002, User's Manual for BUIC III Utility Computer Program, Vol 2 TM 2780/004, General Utility User's Manual for BUIC III Utility Computer Program, Vol 4 Equipment and Training Aids Overhead Projector 026 Card Punch (2) AN/GSA-51A Computer System (9) Training Methods Ds-Dm 4 hrs, P 2 hrs(3)
	Wk13-Dy4	
5. Assemblers. Given a list of UCP assemblers and control inputs; code, punch, and operate inputs to initiate the UCP program assembler and geography assembler programs. (CTS para 4a; 4b,e).	6 C	Instructional Materials C188-BUIC-HO, Dual Reference Maps C192-BUIC-WB, Program Maintenance and Testing TM 2385/108, Displays TM 2780/001, User's Manual for BUIC III Utility Computer Program, Vol 1. TM 2780/002, User's Manual for BUIC III Utility Computer Program, Vol 2 TM 2780/004, User's Manual for BUIC III Utility Computer Program, Vol 4 Equipment and Training Aids Overhead Projector 026 Card Punch (2) AN/GSA-51A Computer System (9) Training Methods Ds-Dm 3 hrs, P 3 hrs(3)

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PLAN OF INSTRUCTION (Continued)		

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
	(3)	Instructional Guidance
a. From a list of statements, select those which are accurate in regard to the functions of the: (1) Program Assembler (PSA and PSB programs) with respect to parameters, data inputs, data outputs, and function identifier.	E	Have students follow the explanation of Program Assembler functions in chapter 2 of TM 2780/004.
(2) Assembler Compool (ASC) with respect to parameters, data inputs, data outputs, and function identifier.	E	Have the students follow the explanation of Assembler Compool functions in chapter 3 of TM 2780/004. Distribute a copy of the assembled BTV compool symbolic printout.
(3) Assemble Geography (ASG) with respect to parameters, data inputs, data outputs, and function identifier.	E	Have the students follow the explanation of the Assembler Geography function in chapter 4 of TM 2780/004.
	Wk13-Dy5	
	(3)	
b. Prepare and test a geography deck.	E	Take students to the laboratory to test their geography decks.
	Wk14-Dy1	
6. Adaptation. Given a list of data sources, programs, and control inputs; code, punch, and load inputs to initiate the adaptation process to prepare unique-to-site adaptation data. (CTS para 4a; 4d)	6 C	Instructional Materials C192-BUIC-WB, Program Maintenance and Testing TM 2385/106, Adaptation TM 2385/206, Adaptation TM 2780/001, User's Manual for BUIC III Utility Computer Program, Vol 1

PLAN OF INSTRUCTION (Continued)

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
		TM 2780/002, User's Manual for BUIC III Utility Computer Program, Vol 2 TM 2780/004, User's Manual for BUIC III Utility Computer Program, Vol 4 TM 3165, BUIC III Environmental Data Equipment and Training Aids Overhead Projector 026 Card Punch (2) AN/GSA-51A Computer System (9) Training Methods Ds-Dm 3 hrs, P 3 hrs(3) Instructional Guidance NOTE: At this point training in this block reverts back to a full 6-hour a day schedule.
	(3)	
a. Select statements which are accurate in regard to the: (1) Function, characteristics, and need for unique-to-site adaptation. (2) Documentation applicable to the adaptation. process. (3) Function of BUIC Adaptation Calculation (BAC). (4) Binary Data Insertion (BDI) function with respect to function identifier, parameters, data inputs, and data outputs. (5) Sequential procedure for use of available documentation to data input cards.	E	Refer students to chapter 6 of TM 2780/004. Refer students to TM 2385/106, TM 3165/001-005 and 025-041, and TM 2385/206. Refer students to chapter 6 of TM 2780/004.
	(3)	

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PLAN OF INSTRUCTION (Continued)		

LEARNING OBJECTIVES	DURATION (HOURS)	SUPPORT MATERIALS AND GUIDANCE
1	2	3
b. Prepare and test a solution to an adaptation problem.	E	Take students to the laboratory and test their adaptation projects.
	Wk14-Dy2	
7. Utility Maintenance System. From a list of descriptive statements, select those which are accurate in regard to the:	3	**Instructional Materials** TM 2780/004, User's Manual for BUIC III Utility Computer Program, Vol 4
		Equipment and Training Aids Overhead Projector
		Training Methods Ds-Dm 3 hrs
		Instructional Guidance
a. Set Use (SUP) function with respect to control card format and symbolic outputs.		Refer students to chapter 18 of TM 2780/004.
b. Documentation (DOC) function with respect to control card format and symbolic outputs.		Refer students to chapter 15 of TM 2780/004.
c. Load Octals on Tape function with respect to control card format and symbolic outputs.		Refer students to chapter 21 of TM 2780/004.
d. Indirect Address and Bar Table reference (IBR) function with respect to control card format and symbolic outputs (CTS para 4a)	E	Refer students to chapter 23 of TM 2780/004.
8. Measurement	3	**Instructional Materials** C176-BUIC-HO, AN/GSA-51A Input/Output Programming Code Card TM 2385/106, Adaptation TM 2385/206, Adaptation TM 2780/001, User's Manual for BUIC III Utility Computer Program, Vol 1 TM 2780/002, User's Manual for BUIC III

LEARNING OBJECTIVES 1	DURATION (HOURS) 2	SUPPORT MATERIALS AND GUIDANCE 3
		Utility Computer Program, Vol 2 TM 2780/004, User's Manual for BUIC III Utility Computer Program, Vol 4 TM 2387/108, Displays TM 3165, BUIC III Environmental Data ATCR 52-3, Measurement (I) ATCM 50-4, Grading Practices (I) TSM 52-1, Chapter 8, Training Doctrine Manual (I) Training Methods Ds 1 hr, TW 2 hrs(2)
	(2)	
a. Examination		
	(1)	
b. Critique		

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