TM 55-6930-214-10

TECHNICAL MANUAL

OPERATOR'S MANUAL

FOR

AH-64A (APACHE) COMBAT MISSION SIMULATOR

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HEADQUARTERS, DEPARTMENT OF THE ARMY
15 MARCH 1988

CHANGE
NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 30 April 1992

Operator's Manual

for

AH-64A (Apache) Combat Mission Simulator

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1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

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i through xi/xii	i through xi/xii
l-l/l-2	l-1/1-2
2-l through 2-6	2-l through 2-4
2-9 through 2-16	2-9 through 2-15/2-16
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- - - -	7-50.1/7-50.2
7-51 through 7-56	7-51 through 7-56
- - - -	7-56.1 and 7-56.2
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- - - -	7-90.1 through 7-90.6
7-91 through 7-114	7-91 through 7-114
- - - -	7-114.1/7-114.2
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7-263 and 7-264	7-263 and 7-264
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Remove pages	Insert pages
Glossary 3 and Glossary 4	Glossary 3 and Glossary 4
Index 1 through Index 7/8	Index 1 through Index 7/8

2. Retain this sheet in front of manual for reference purposes.

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No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 17 January 1989

Operator's Manual

for

AH-64A (Apache) Combat Mission Simulator

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A and B	A and B
- - -	C/D
vii and viii	vii and viii
2-l and 2-2	2-1 and 2-2
2-7 through 2-10	2-7 through 2-10
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- - -	7-180.1 through 7-180.3/7-180.4
7-181 through 7-276	7-181 through 7-276
Index 5 and Index 6	Index 5 and Index 6

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CARL E. VUONO,
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
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DISTRIBUTION:
To be distributed in accordance with DA Form 12-31 (-10 and CL Maintenance Requirements for AH-64A Helicopter, Attack, (Apache).

WARNING

HIGH VOLTAGE

is used in the operation of this equipment.

DEATH ON CONTACT

or severe injury may result if personnel fail to observe safety precautions.

Learn the areas containing high voltage in each piece of equipment.

Under no circumstances should operation of this device be undertaken when cabinets and/or protective covers are removed or open.

WARNING

Motion system operation requires that SEAT BELTS BE USED AT ALL TIMES.

In the case of runaway motion, immediately activate EMERGENCY STOP switch.

DEATH

or severe injury may result if personnel fail to observe safety precautions.

WARNING

EMERGENCY STOP

Controls are located at each trainee station control panel and at each instructor/operator console. Depressing this switch shuts down the entire simulator complex.

DEATH

or severe injury may result if personnel fail to observe safety precautions.

WARNING

Sensors that detect heat, lack of airflow, and unsafe mechanical conditions are provided. UNDER NO CIRCUMSTANCES SHOULD THE MISSION SIMULATOR BE OPERATED WITH A SAFETY INTERLOCK BYPASSED.

DEATH

or severe injury may result if personnel fail to observe safety precautions.

WARNING

FIRE

Should fire develop, activate EMERGENCY STOP and exit cockpit. DO NOT USE FIRE EXTINGUISHER IN CONFINED COCKPIT.

DEATH

or severe injury may result if personnel fail to observe safety precautions.

WARNING

BOARDING RAMP

May fail to deploy during a power failure. Caution should be exercised when exiting simulator.

DEATH

or severe injury may result if personnel fail to observe safety precautions.

WARNING

Releasing trainer from freeze condition with incorrect rotor rpm may cause motion surges.

DEATH

or severe injury may result if personnel fail to observe safety precautions.

WARNING

FLIGHT CONTROLS

may move abruptly upon initial turn on or demonstration exercises. Keep clear of cockpit controls until neutral position is reached.

DEATH

or severe injury may result if personnel fail to observe safety precautions.

WARNING

FIRE EXTINGUISHER

Exposure to high concentrations of monobromotrifluoromethane (CF_3Br) extinguishing agent or decomposition products should be avoided. The liquid should not be allowed to come into contact with the skin because it causes frostbite or low-temperature burns.

WARNING

FIRE EXTINGUISHING SYSTEM (HALON)

Halon gas is used as a fire extinguishing agent throughout the simulator complex. Halon gas displaces oxygen in confined spaces. Asphyxiation can result if cockpit is not evacuated immediately upon Halon discharge.

DEATH

or severe Injury may result if personnel fail to observe safety precautions.

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

LIST OF EFFECTIVE PAGES

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by change legends.

Dates of issue for original and changed pages are:

Original......0........ 15 March 88
Change.......1........ 17 Jan 89

Page No.	*Change No.
a - c	0
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Title	1
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C	1
D Blank	1
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Blank	0
i - vii	0
viii	1
ix - xi	0
xii Blank	0
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2-2 - 2-6	0
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7-45 - 7-50	1
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7-103 - 7-104	0
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7-115 - 7-126	0
7-127	1
7-128 - 7-130	0
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7-133 - 7-135	0
7-136 - 7-137	1
7-138 - 7-140	0
7-141	1
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7-174 Blank	0
7-175	0
7-176 - 7-180.3	1
7-180.4 Blank	1
7-181 - 7-282	1
8-l - 8-4	0
Glossary 1 - Glossary 5	0
Glossary 6 Blank	0
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Page No.	*Change No.	Page No.	*Change No.	Page No.	*Change No.
Index 7	0				
Index 8 Blank	0				

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CHANGE NO.	DATE	TITLE OR BRIEF DESCRIPTION	ENTERED BY
1	17 JANUARY 1989	INCORPORATION OF CUSTOMER COMMENTS TO EXISTING MANUAL	SINGER - LINK

PREFACE

The M-64 Combat Mission Simulator (CMS), designed and manufactured by CAR-Link Corp. , Link Plight Simulation Division, Binghamton, New York, has been specifically developed for flight simulation relative to high-performance aircraft. This manual contains operating Instructions for both the pilot and copilot/gunner stations of the M-64 CMS.

Notations used in this manual are as follows:

WARNING

> Operating and maintenance procedures, practices, etc., that must be strictly observed to prevent injury to personnel or loss of life.

CAUTION

> Operating and maintenance procedures, etc., that must be observed to prevent equipment damage.

NOTE

> Operating and maintenance procedures, condition, or Information, etc., requiring particular emphasis.

EFFECTIVITY CODING. This manual reflects all differences that exist between simulators (for hardware and/or operation) with effectivity codes; otherwise, the data is applicable to all simulators. The following codes denoting differences are used when the data pertains to a specific simulator. The simulator codes are defined as follows:

(1) = Simulator No. 2137020 (prototype)
(2) = Simulator No. 2137021

SECURITY REQUIREMENTS. The AH-64 CMS simulates the Apache helicopter and its related systems to the same level of performance as found in the operational systems. The CMS, therefore, must be protected to the same level as the aircraft operational systems where they are classified.

In addition, the CMS can be used to demonstrate or teach tactical threat engagement scenarios. Demonstration of these scenarios in the CMS is classified to the same level as the operational mission description. The System Security Classification Guides (SCG) listed below apply, to the latest revision, including declassification provisions:

Advanced Attack Helicopter (AAH) SCG dated 1 October 1984, with Revision No. 1, dated 1 October 1985

Target Acquisition Designation Sight (TADS) and Pilot Night Vision Sensor (PNVS) SCG dated 1 October 1984 and Revision 2 dated 18 January 1985

Hellfire Laser Air Defense Suppression and Fire and Target Guided Missile System SCG, dated 12 August 1985

Active Infrared Jammers AN/ALQ-147 and AN/ALQ-144 SCG. dated 1 December 1980

Radar Jammer AN/ALQ-136 SCG. dated 1 December 1980

Dispenser, General Purpose, Aircraft Ml30 SCG, dated 1 December 1980

Radar Warning Receiver AN/APR-39 SCG, dated 1 December 1980

VRS UHF-AM COM Radio Set with Have Quick AN/ARC-164(v)

Each CMS installation must be designed to physically protect the device by limiting access to unauthorized personnel. When the CMS is not in operation, with the software (disk packs, magnetic tapes) removed, it is unclassified. When the software is loaded Into the CMS and the device is operational, It is classified SECRET. CMS disk packs and magnetic tapes are classified SECRET in accordance with the highest level of information derived from the aircraft systems data contained on the disk.

Publications. Publications, reports, drawings. schematics, photographs, mockups, training aids, test data, etc.. are assigned a security classification commensurate with that of the performance characteristic of the classified elements of the system and are declassified In accordance with the same document. There are two classified annexes (Threat and Ownship Weapon Scoring) to the Trainer Test Procedures and Results Report, Volume I, Book 5. All other test documentation is unclassified.

Hardware. All CMS hardware is unclassified. In order to reduce electromagnetic radiation which may contain classified information, several hardware features have been incorporated into the CMS. There features include cabinets, connectors. and cable shielding. Operation, maintenance and modification of the device must preserve these features. During maintenance processes, configuration of the equipment must be maintained In accordance with the assembly drawings, wiring diagrams. and cable diagrams to avoid compromising electromagnetic radiation security. In addition to operation with cabinet doors closed (cockpit and signal conversion equipment only) some cables may possibly radiate information' if shielding is compromised.

All data on this page deleted.

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SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during many phases of operation and maintenance.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must at all times observe all safety regulations. Do not replace components or make adjustments inside the equipment with the high-voltage supply turned on. Under certain conditions, dangerous potentials may exist when the power control is in the off position, due to charges retained by capacitors. To avoid casualties, always remove power and discharge and ground a circuit before touching it.

DO NOT SERVICE OR ADJUST ALONE

Under no circumstances should any person reach into or enter the enclosure for the purpose of servicing or adjusting the equipment except in the presence of someone who is capable of rendering aid.

RESUSCITATION

Personnel working with or near high voltages should be familiar with modern methods of resuscitation. Such information may be obtained from the Bureau of Medicine and Surgery .

The following warnings appear in the text in this manual and are repeated here for emphasis :

WARNING

Flight controls may move abruptly upon system turn-on, initial conditions insertion, demonstration maneuvers or conditions store/reset. Keep clear of controls until neutral position is reached. (Pages 2-31, 7-7)

WARNING

Care should be exercised when exiting the simulator during power failure. The boarding ramp may fail to deploy. (Page 8-1)

WARNING

Prior to the activation of motion, all occupants of the simulated cockpit and IOS (limited to three persons per flight compartment) are required to fasten seat belts. (Page 8-3)

WARNING

Do not discharge a CG_3BR fire extinguisher in the confined cockpit .

(Page 8-4)

CAUTION

Due to abnormal shutdown possible hardware damage may occur.

(Pages 7-1, 8-1)

CHAPTER 1

INTRODUCTION

1-1. SCOPE. This operator's manual contains complete operating instructions and procedures for the combat mission simulator (CMS) system for the AR-64 (Apache) helicopter. This manual is only for use by an instructor/operator for the training of pilots (PLT) and/or copilot/gunners (CPG) in the techniques Involved for all normal and emergency flight, tactical maneuvers, and weapons delivery of the Apache helicopter.

l-2. GENERAL. The CMS consists of two operational flight simulator compartments (PLT and CPG), each having a six-degree-of-freedom motion system. Each is equipped with a visual system that simulates natural helicopter environment surroundings. A central computer system controls the operation of the simulator complex. The hardware and software that comprise this complex were designed and built by CAE-Link Corp., Binghamton, New York.

a. Simulation. The CMS provides normal and emergency procedural mission training and weapons delivery. Additional capabilities include navigation Instrument flight operation, day, dusk, and night visual flight operations, and ordnance delivery systems of the attack helicopter.

b. Configuration. The basis for simulation and configuration of the AH-64 (Apache) CMS is the aircraft data available as of 1 June 1983 under the basic contract.

1-3. TECHNICAL MANUAL CHANGES. Changes and supplements to this manual will be published when necessary to add, delete, or change an operating requirement. Such changes will be based on factual data accumulated as a result of operating experience with the training device and equipment. changes to the text are indicated by a vertical line in the outer margin extending close to the entire area of the material affected. Changes to illustrations and wiring diagrams are indicated by change legends.

l-4. FORMS AND RECORDS. Maintenance forms and records used by all levels of maintenance personnel are in DA Pamphlet 738-751.

l-5. REPORTING OF ERRORS. Report of errors or omissions and recommendations for improving this publication by the user are encouraged. Reports should be submitted on DA Form 2028, Recommended Changes to Publications, and forwarded direct to U.S. Army Aviation Systems Command, Attn: AMSAV-MC, 4300 Goodfellow Blvd., St. Louis, MO. 63120-1798

1-6. ABBREVIATIONS. Nonstandard abbreviations and acronyms used in this manual are contained in the Glossary.

CHAPTER 2

SYSTEM DESCRIPTION AND OPERATION

Section I. GENERAL

2-1. OPERATIONAL SYSTEM. The AH-64 CMS is a fixed-base simulation system designed for training in the use of AH-64 Apache helicopters. Figure 2-1 shows the recommended general arrangement of a portion of the system complex within the Government-built facility. The simulator room, where training is conducted, consists of two instructor/trainee stations equipped with visual display systems. Bach station is mounted on a six-degree-of-freedom hydraulic motion system and controlled by a central computer system. The basic areas of the simulator complex are further described in the following paragraphs.

2-2. SIMULATOR COMPARTMENTS. The simulator room contains separate mission simulator compartments for individual training of pilot and copilot/gunner (CPG) trainees. Each simulator compartment houses a cockpit station and an instructor/operator station (IOS). The cockpit (trainee) stations are located in the forward portion of their respective compartments. Each CPG simulator compartment includes visual, motion, and sound simulation. The pilot and CPG trainees can train either in independent modes of operation with separate and unique flight conditions, or in an integrated mode with common training conditions.

a. The pilot trainee station is a replica of the aircraft pilot position and includes facsimiles of the cockpit window arrangements, pilot seat, main instrument and control panel, flight controls, integrated helmet and display sight system (IHADSS), pilot night vision sensor (PNVS), target acquisition/designation sight (TADS), and video display unit (VDU). Left and right equipment consoles are actual aircraft-type parts.

b. The CPG trainee station is a replica of the aircraft CPG position. Actual aircraft cockpit equipment includes the main instrument and control panel, left and right equipment consoles, flight controls, integrated helmet and display sight system (IHADSS), optical relay tube (ORT), pilot night vision sensor (PNVS), target acquisition/designation sight (TADS), and video recorder system (VRS).

c. All controls, indicators. and panels operate in a simulated condition and are identical in appearance to those in TM 55-1520-238-10. Operator's Manual for AH-64 Apache Helicopter.

d. Three pairs of loudspeakers and one subwoofer in each simulator compartment provide realistic aural cue sounds with characteristics correct in respect to location, frequency, and loudness (within limits of safety). Aural cue sounds can be varied in loudness by the instructor.

e. The trainee cockpit seats can be vibrated to simulate the continuous and periodic oscillations and vibrations experienced by the crew during flight conditions and maneuvers. Vibrations representing progressive malfunctions are also simulated. Seat vibration is isolated from the remainder of the simulator compartment by means of damping elements in the seat mounting construction.

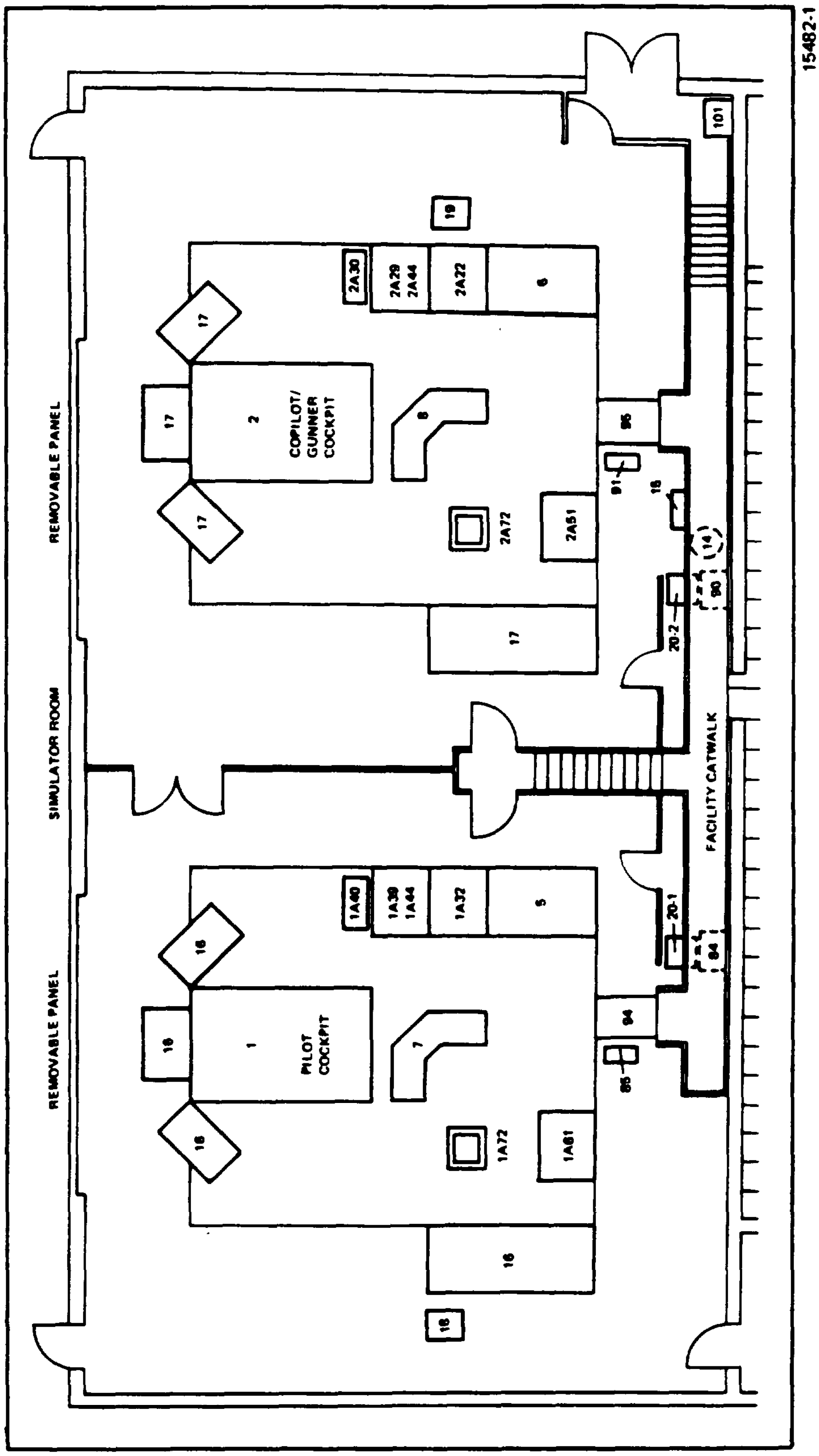
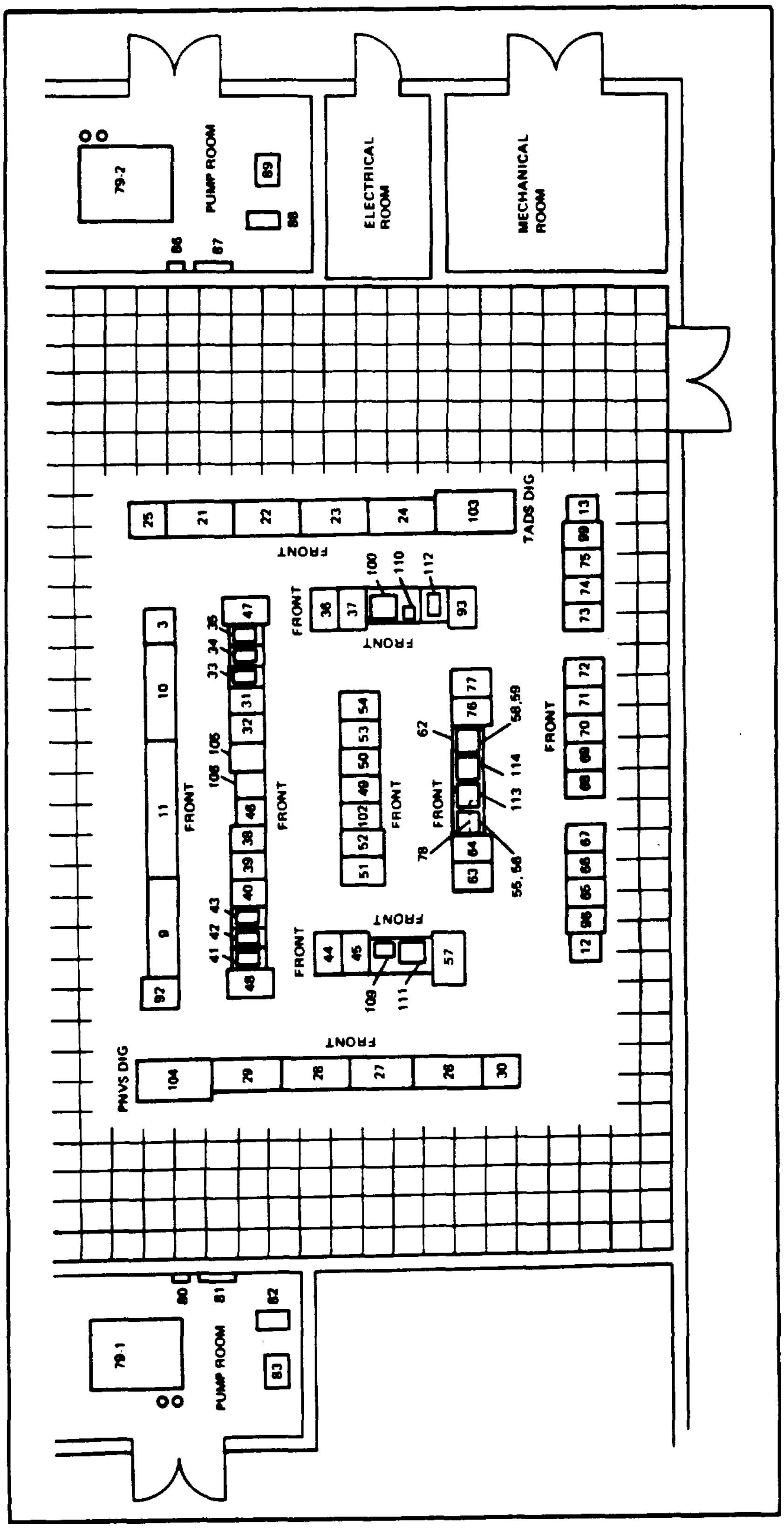


Figure 2-1. Typical AH-64 CMS and Computer Rooms System Complex (Sheet 1)



15482-2

Figure 2-1. Typical AH-64 CMS and Computer Rooms System Complex (Sheet 2)

UNIT/ REF DES	IDENTIFICATION	UNIT/ REF DES	IDENTIFICATION
1	PILOT COCKPIT (TRAINEE SECTION)	58	CRT DISPLAY
2	COPILOT/GUNNER COCKPIT (TRAINEE SECTION)	59	650 THERMAL PRINTER
3	VISUAL INTERFACE CABINET	60	(NOT USED)
4-l	PILOT MOTION PLATFORM	61	(NOT USED)
4-2	COPILOT/GUNNER MOTION PLATFORM	62	CRT TERMINAL MPCS-E
5	PILOT COCKPIT CABINE T	63	DISK UNIT 1
6	COPILOT/GUNNER COCKPIT CABINET	64	DISK UNIT 2
7	PILOT INSTRUCTOR OPERATOR STATION	65	CPU CABINET 3
8	COPILOT/GUNNER INSTRUCTOR STATION	66	I/O CABINET 2
9	PILOT FLOOR CABINET (3-BAY)	67	CPU CABINET 2
10	COPILOT/GUNNER FLOOR CABINET (3-BAY)	68	I/O CABINET 1
11	POWER CABINET	69	CPU CABINET 1
I2	PILOT FCC/MASTER CONTROLLER CABINET	70	SHARED MEMORY CABINET 1
13	COPILOT/GUNNER FCC/MASTER CONTROLLER CABINET	71	CPU CABINET
14	400-HZ MOTOR-GENERATOR SET	72	I/O CABINET 4
15	400-HZ CONTROL BOX	73	CPU CABINET 5
16	PILOT VISUAL SYSTEM	74	I/O CABINET 6
17	COPILOT/GUNNER VISUAL SYSTEM	75	CPU CABINET 6
18	PILOT AIR CONDITIONER	76	DlSK UNIT 5
19	COPILOT/GUNNER AIR CONDITIONER	77	DISK UNIT 6
20-l	PILOT MOTION CABINET	78	COMPUTER ROOM AUDIO BOX
20-2	COPILOT/GUNNER MOTION CABINET	79-l	PILOT HYDRAULIC MOTION PUMP
21	1-CHANNEL PRIORITY SECTOR PROCESSOR CABINET	79-2	COPILOT/GUNNER HYDRAULIC MOTION PUMP
22	I-CHANNEL FRAME CALCULATOR CABINET	80	PILOT CONTROL LOADING - CONTROL BOX
23	1-CHANNEL FRAME SCANLINE COMPUTER CABINET	91	PILOT CONTROL LOADING - START/STOP BOX
24	l-CHANNEL VIDEO GENERATOR CABINET	82	PILOT CONTROL LOADING - HYDRAULIC POWER
25	I-CHANNEL POWER CABINET	83	PILOT CONTROL LOADING - OIL COOLER
26	3-CHANNEL PRIORITY SECTOR PROCESSING CABINET	84	PILOT CONTROL LOADING- CONSOLE
27	3-CHANNEL FRAME CALCULATOR CABINET	85	PILOT CONTROL LOADING - VACUUM PUMP
28	3-CHANNEL SCANLINE COMPUTER CABINET	86	COPILOT/GUNNER CONTROL LOADING -CONTROL BOX
29	3-CHANNEL VIDEO GENERATOR CABINET	87	COPILOT/GUNNER CONTROL LOADING - START/STOP BOX
30	3-CHANNEL POWER CABINET	88	COPILOT/GUNNER CONTROL LOADING -HYDRAULIC POWER
31	TADS CPU COMPUTER CABINET	89	COPILOT/GUNNER CONTROL LOADING-OIL COOLER
32	TADS SUPPORT COMPUTER CABINET	90	COPILOT/GUNNER CONTROL LOADING- CONSOLE
33	TADS 8260AT DELTA TERMINAL UNIT (CONSOLE)	91	COPILOT/GUNNER CONTROL LOADING - VACUUM PUMP
34	TADS 655 HARDCOPY UNIT	92	PNVS FLIR CABINET
35	TADS 8260AT DELTA CRT TERMINAL UNIT (DIG DIAGNOSTICS)	93	TADS FLIR CABINET
36	TADS DISK UNIT	94	PILOT RAMP
37	TADS DISK UNIT	95	COPILOT/GUNNER RAMP
38	PNVS CPU COMPUTER CABINET	96	APU CABINET 3
39	PNVS SUPPORT COMPUTER CABINET	97	(NOT USED)
40	MAGNETIC TAPE UNIT COMPUTER CABINET	98	(NOT USED)
41	PNVS 8260AT DELTA CRT TERMINAL UNIT (CONSOLE)	99	APU CABINET S
42	PNVS 655 HARDCOPY UNIT	l00	CRT TERMINAL
43	PNVS 8260AT DELTA CRT TERMINAL UNIT (CONSOLE)	101	FIRE DETECTION CABINET
44	PNVS DISK UNIT	102	APU CABINET 1
45	PNVS DISK UNIT	103	DIG TEXTURE CABINET - TADS
46	LINE PRINTER	104	DIG TEXTURE CABINET - PNVS
47	MAINTENANCE CONSOLE - TADS VISUAL CONTROL CONSOLE	105	MTU - l-CHANNEL
48	MAINTENANCE CONSOLE - TAOS VISUAL CONTROL CONSOLE	106	LINE PRINTER -1-CHANNEL
49	MAGNETIC TAPE UNIT COMPUTER CABINET	107	(NOT USED)
50	SHARED I/O CABINET	l08	(NOT USED)
51	DISK UNIT - 3	109	SWITCH BOX
52	DlSK UNIT - 4	110	SWITCH BOX
53	SHARED MEMORY CABINET 2	1l1	PRINTER
54	CPU CABINET 7	112	PRINTER
55	CR1 DISPLAY	113	CRT 5
56	650 THERMAL PRINTER	114	CRT 6
57	LINE PRINTER		

Figure 2-1. Typical AH-64 CMS and Computer Rooms System Complex (Sheet 3)

All data on pages 2-5 and 2-6 deleted.

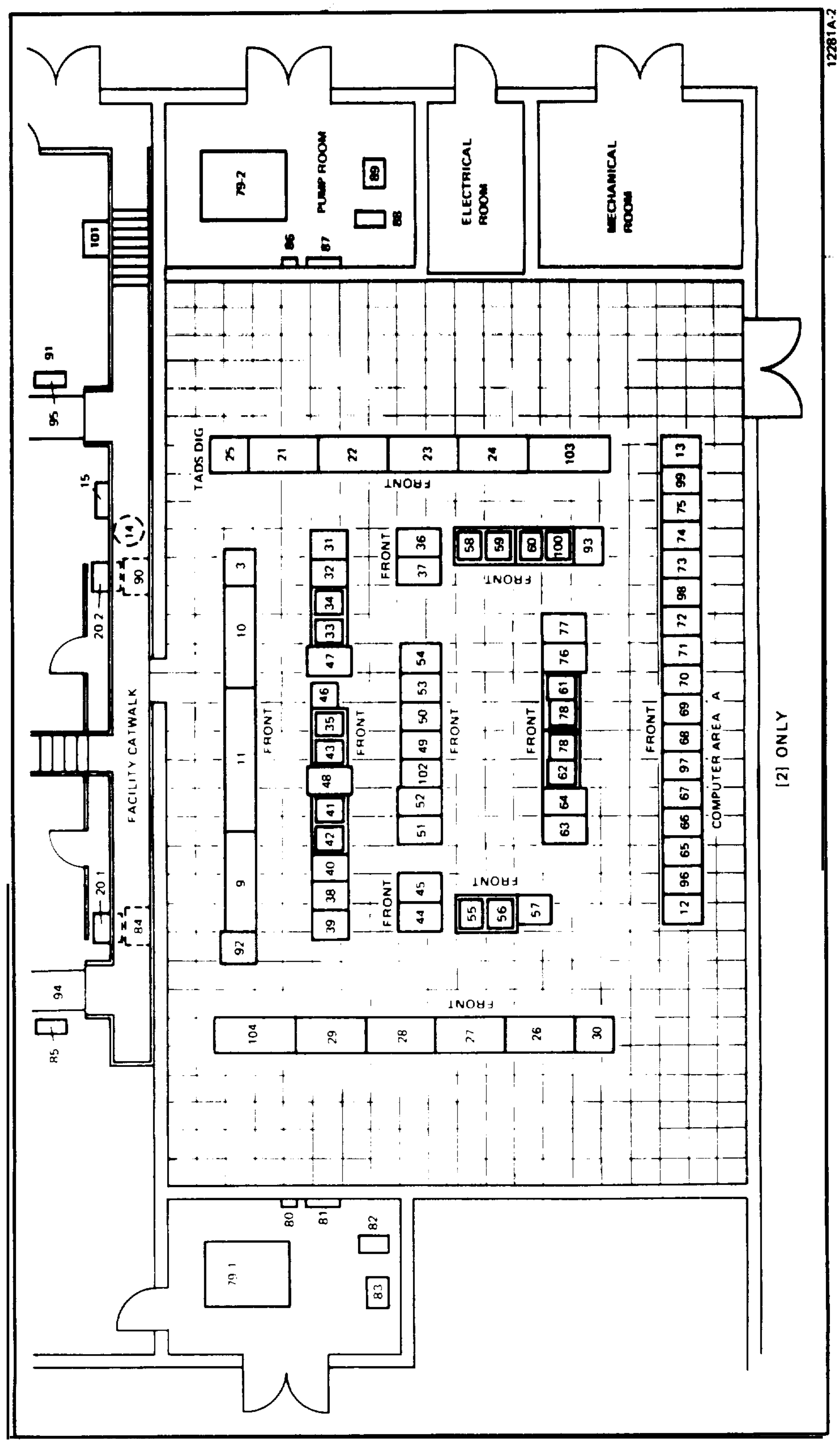


Figure 2-1. Typical AH-64 CMS and Computer Rooms System Complex (Sheet 4)

UNIT/ REF DES	IDENTIFICATION	UNIT/ REF DES	IDENTIFICATION
1	PILOT COCKPIT (TRAINEE SECTION)	55	CRT DISPLAY
2	COPILOT/GUNNER COCKPIT (TRAINEE SECTION)	56	HARDCOPY UNIT
3	VISUAL INTERFACE CABINET	57	CRT TERMINAL
4-1	PILOT MOTION PLATFORM	58	CRT DISPLAY
4-2	COPILOT/GUNNER MOTION PLATFORM	59	HARDCOPY UNIT
5	PILOT COCKPILOT CABINET	60	LINE PRINTER
6	PILOT/GUNNER COCKPIT CABINET	61	CRT TERMINAL
7	PILOT INSTRUCTOR OPERATOR STATION	62	CRT TERMINAL
8	COPILOT/GUNNNER INSTRUCTOR OPERATOR STATION	63	DISK UNIT 1
9	PILOT FLOOR CABINET (3-DAY)	64	DISK UNIT 2
10	COPILOT/ FLOOR (1 CABINET (3-DAY)	65	CPU CABINET 3
11	POWER CABINET	66	I/O CABINET 3
12	PILOT FCC/MASTER CONTROLLER CABINET	67	CPU CABINET 2
13	COPILOT/GUNNER FCC/MASTER CONTROLLER CABINET	68	I/O CABINET 1, 2
14	4OO-HZ MOTOR-GENERATOR SET	69	CPU CABINET 1
15	4OO-HZ CONTROL BOX	70	SHARED MEMORY CABINET 1
16	PILOT VISUAL SYSTEM	71	CPU CABINET 4
17	COPILOT/GUNNER VISUAL SYSTEM	72	I/O CABINET 4, 5
18	PILOT AIR CONDITIONER	73	CPU CABINET 5
19	COPILOT/GUNNER AIR CONDITIONER	74	I/O CABINET 6
20-1	PILOT MOTION CABINET	75	CPU CABINET 6
20-2	COPILOT/GUNNER MOTION CABINET	76	DISK UNIT 5
21	1-CHANNEL PRIORITY SECTOR PROCESSOR CABINET	77	DISK UNIT 6
22	1-CHANNEL FRAME CALCULATOR CABINET	78	COMPUTER ROOM AUDIO BOX
23	1-CHANNEL SCANLINE COMPUTER CABINET	79-1	PILOT HYDRAULIC MOTION PUMP
24	1-CHANNEL VIDEO GENERATOR CABINET	79-2	COPILOT/GUNNER HYDRAULIC MOTION PUMP
25	1-CHANNEL POWER CABINET	80	PILOT CONTROL LOADING - CONTROL BOX
26	3-CHANNEL PRIORITY SECTOR PROCESSING CABINET	81	PILOT CONTROL LOADING - START/STOP BOX
27	3-CHANNEL FRAME CALCULATOR CABINET	82	PILOT CONTROL LOADING - HYDRAULIC POWER
28	3-CHANNEL SCANLINE COMPUTER CABINET	83	PILOT CONTROL LOADING - OIL COOLER
29	3-CHANNEL VIDEO GENERATOR CABINET	84	PILOT CONTROL LOADING - CONSOLE
30	3-CHANNEL POWER CABINET	85	PILOT CONTROL LOADING -VACUUM PUMP
31	TADS CPU COMPUTER CABINET	86	COPILOT/GUNNER CONTROL LOADING - CONTROL BOX
32	TADS SUPPORT COMPUTER CABINET	87	COPILOT/GUNNER CONTROL LOADING - START/STOP BOX
33	TADS 550 CRT TERMINAL UNIT (CONSOLE)	88	COPILOT/GUNNER CONTROL LOADING - HYDRAULIC POWER
34	TADS 655 HARDCOPY UNIT	89	COPILOT/GUNNER CONTROL LOADING - OIL COOLER
35	TADS 550 CRT TERMINAL UNIT (DIG DIAGNOSTICS)	90	COPILOT/GUNNER CONTROL LOADING - CONSOLE
36	TADS DISK UNIT	91	COPILOT/GUNNER CONTROL LOADING - VACUUM PUMP
37	TADS DISK UNIT	92	PNVS FLIR CABINET
38	PNVS CPU COMPUTER CABINET	93	TADS FLIR & CABINET
39	PNVS SUPPORT COMPUTER CABINET	94	PILOT RAMP
40	MAGNETIC TAPE UNIT COMPUTER CABINET	95	COPILOT/GUNNER RAMP
41	PNVS 550 CRT TERMINAL WIT (CONSOLE)	96	APU CABINET 3
42	PNVS 655 HARDCOPY UNIT	97	APU CABINET 2
43	PNVS 550 CRT TERMINAL UNIT (CONSOLE)	98	APU CABINET 4
44	PNVS DISK UNIT	99	APU CABINET 5
45	PNVS DISK UNIT	100	CRT TERMINAL
46	LINE PRINTER	101	FIRE DETECTION CABINET
47	MAINTENANCE CONSOLE - TADS VISUAL CONTROL CONSOLE	102	APU CABINET 1
		103	DIG TEXTURE CABINET - TADS
48	MAINTENANCE CONSOLE - TADS VISUAL CONTROL CONSOLE	103	NOT USED
		104	DIG TEXTURE CABINET - PNVS
49	MAGNETIC TAPE UNIT COMPUTER CABINET	104	NOT USED
50	SHARED I/0 CABINET	105	RESERVED FOR MTU - 1-CHANNEL
51	DISK UNIT - 3	106	RESERVED FOR LINE PRINTER - 1-CHANNEL
52	DISK UNIT - 4	107	RESERVED FOR LINE PRINTER - 1-CHANNEL
53	SHARED MEMORY CABINET 2	108	RESERVE0 FOR LINE PRINTER - 3-CHANNEL
54	CPU CABINET 7		

EFFECTIVITY CODES:

[1] 2137020-001 ONLY
[2] 2137021-00l ONLY

Figure 2-1. Typical AH-64 CMS and Computer Rooms System Complex (Sheet 5)

f. The ambient temperature of the simulator compartment and the cockpit is controlled by adjusting the thermostat located on the back wall of the compartment. Conditioned air is ducted through the compartment area and the normal helicopter cockpit heating and defrosting ducts. The cockpit environment control system switches and controls are nonfunctional.

g. A platform step is provided alongside each cockpit to facilitate entrance and exit. Low-level step lighting is provided for safety and is a function of the facility power.

2-3. INSTRUCTOR/ OPERATOR STATIONS. The instructor/operator stations (IOS) are located adjacent and to the rear of the cockpit In each simulator compartment. (Refer to Section II for further details.) The IOS allows instructors/operators to control the training program and effectively monitor and evaluate trainee performance. During training, the pilot and CPG IOS function in either independent or integrated modes of operation.

2-4. MOTION SYSTEM. Each simulator compartment is mounted on a six-degree-of-freedom (6-DOF) motion system consisting of a moving platform assembly driven and supported from below by six identical hydraulic actuators. The motion system is capable of providing cues for pitch, roll, yaw, lateral, longitudinal, and vertical movements. System motion can be either Independent (without simultaneous motion in any other degree of freedom) or in any combination desired to produce real-time dynamic motion cues.

a. Flight simulation includes combined motion representing changes in aircraft attitude as a direct result of flight controls, rough air, and wind, and changes in aircraft weight and center-of-gravity resulting from fuel consumption or weapon and ammunition depletion. Also, motion effects such as droop-stop pounding, blade stall, blade imbalance, damper failure, blades out-of-track, and touchdown impact can be produced.

b. The computer-controlled simulation program causes the motion system to respond realistically to aerodynamic forces and moments within the mechanical limits of the system. All motions except pitch are imperceptibly washed out to the neutral position after the computed accelerations have reached zero. Pitch attitude is maintained as necessary to simulate sustained longitudinal acceleration cues. Acceleration onset cues are scaled as large as possible to fully utilize the range of motion capabilities of each degree-of-freedom.

c. Depending on the particular flight program, the motion system responds to computer input signals as noted in the following examples:

(1) Ground conditions. The motion system provides the vibrational indications appropriate to motion of the aircraft during startup. The system produces a random, low-frequency, low-amplitude. multidirectional oscillation with reasonably abrupt application. The computer simulation program varies the amplitude of oscillation to reproduce the irregularities of less than ideal flight takeoff conditions.

(2) Takeoff and landing. The motion system provides simulated realistic effects for all forms of takeoff, flight, and landing conditions.

(a) During engine runup and initial hover for takeoff, the ground performance of the motion system is as described in paragraph (1). The motion system maintains an attitude appropriate for hover and provides the correct indications of takeoff. Appropriate motion effects occur as a result of changes in acceleration and lift during transition to forward flight.

(b) Similar effects are reproduced during the landing phase. The motion system causes appropriate longitudinal, vertical, and low-frequency vibration effects to occur as in the helicopter. The motion system correctly reproduces the landing impact according to the existing aircraft attitude and vertical and side-slip velocities. When the vertical momentum is greater than the absorption capabilities of the landing gear, landing bounce is simulated.

(3) Normal flight. The motion system correctly simulates the complex and repeated cues occurring during maneuvers associated with normal flight conditions. The random introduction of varying degrees of turbulence produces the appropriate motion effects of small variations in yaw and roll, climb or descent, and airspeed. Superimposed upon the flight maneuver motions is the background motion. The motion system provides characteristic periodic oscillations of the aircraft, lateral instability, and aircraft vibrations up to a maximum of 5 cycles per second. Continuous higher frequency vibrations are simulated using the seat shaker in lieu of the motion system.

(4) Abnormal flight. The motion system correctly reproduces the effects of rotor out-of-track and rotor out-of-balance failures. The motion simulated includes the effect of momentary incorrect control inputs as well as conditions appropriate to malfunctions. An aircraft hydraulic system failure resulting in abnormal directional control of the aircraft is provided by appropriate motion cues. High airspeed characteristics and trim change effects are also produced by the motion system.

2-5. VISUAL SYSTEM. The pilot and CPG trainee stations are provided with forward, left, and right side window visual displays. The visual generation system provides imagery to every sensor display in the CMS, including IHADSS, PNVS, OTW scene, VDU, and TADS/FLIR. (Refer to Chapter 6 for visual systems details.)

2-6. COMPUTER SYSTEM. In a nonrigorous sense, the CMS consists of the pilot main computational system (MCS), made up of central processing units (CPU’s) 1, 2. and 3 and their associated auxiliary processing units (APU's); and the CPG MCS, made up of CPU’s 4, 5, and 6 and their associated APU’s. Bach CPU has private memory that only It and its associated APU’s can access. The CPG MCS has complex shared memory that only CPU’s 4, 5, and 6 can access. The pilot MCS has complex shared memory that only CPU’s 1, 2, and 3 can access. In addition, a memory region called global memory exists that all six CPU’s can access.

Section II. INSTRUCTOR/OPERATOR STATION DESCRIPTION

2-7. GENERAL DESCRIPTION. Each instructor/operator station (IOS) accommodates one instructor and an observer. (Figure 2-2 indicates the arrangement of the instructor/operator stations and their relationship with the trainee stations.) The IOS arrangement permits close, direct contact between instructors/operators and trainees. The locations of the forward control panel and the console control panel provide convenient control of each or both cockpits, and direct contact with the CRT displays of information required to monitor, guide, and evaluate trainee performance . Brief descriptions of the various features of the instructor areas are given in the following paragraphs.

2-8. IOS CONTROL PANELS. AT each IOS, two control panels provide control and management of simulator training. The panels are similar, with the exception of special controls at the CPG IOS that are used in conjunction with automatic flight programs when the CPG cockpit is operated in the independent mode. (Figure 2-3 illustrates the pilot and CPG IOS consoles control panels.) To the left of the CRT's is the forward control panel (figure 2-4), which provides selection controls for the instructors video monitor, discrete controls for some training features, and a discrete control for communications with the computer room. On the bulkhead, left of the cockpit, is a control panel for observer communications, the IOS ambient lighting, and step lights. (The trainee flight compartment layout is shown in figure 2-6.) Panel layout is such that maximum efficiency and ease of controlling any training situation is ensured. Two CRT's provide simultaneous viewing of the PLT and CPG PNVS/TADS information. Related CRT display controls, problem flight characteristics and controls, and simulator setup and communications controls are on the console control panel. Only minor differences exist in the control labeling and functions between the pilot and CPG IOS panels.

2-9. TRAINER CONTROL PANELS. The pilot and CPG trainee control panels are located along the outer edge of the left side canopy rails. (See figure 2-7.)

2-10. INSTRUCTION SEATS. The instructor seat is mounted on a track to allow forward or rearward adjustment for optimum positioning. The seat also has a 360-degree swivel capability, as well as up and down adjustment, to enable the instructor to adjust for optimum CRT and/or cockpit station instruments viewing angle. Positive locks in the track, swivel, and height systems prevent the seat from moving in response to motions of the simulator compartment. The normal position of the seat places the instructor's eye level slightly above and to the left of the trainee's eye level to permit easier surveillance of the cockpit instrument and control panels.

2-11. OBSERVER SEATS. An observer seat, equipped with fold-down arms and an abdominal seat belt, is located to the left of the IOS console in the simulator compartment. It is mounted on a track to allow side to side adjustment facilitating overall viewing of instructor/trainee performance. An intercommunications system (ICS) control panel on the wall and separate headset jack in the ceiling, with a cord of sufficient length so as to be noninterferring, provide observer communication with the instructor.

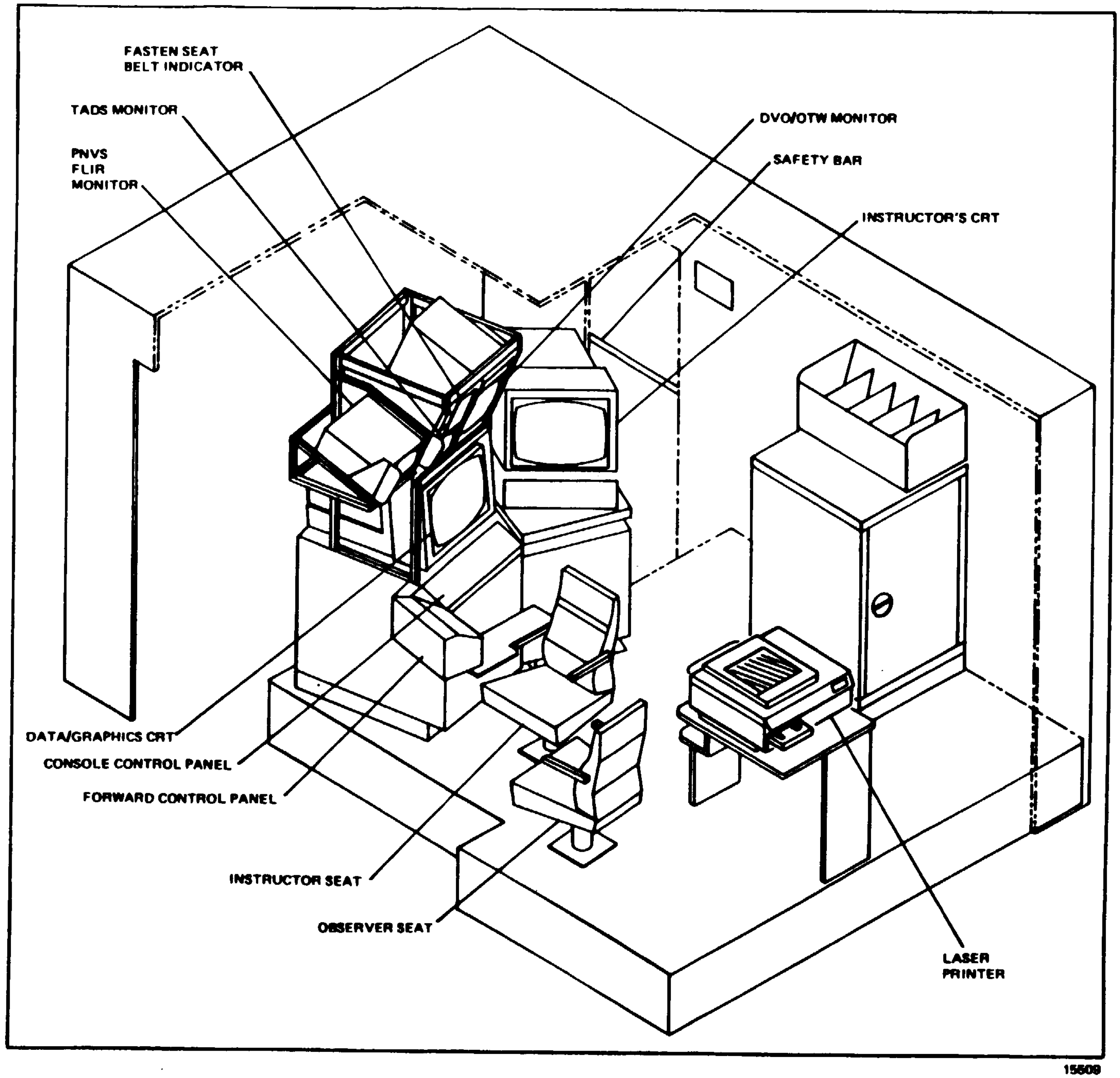


Figure 2-2. Instructor/Operator Station

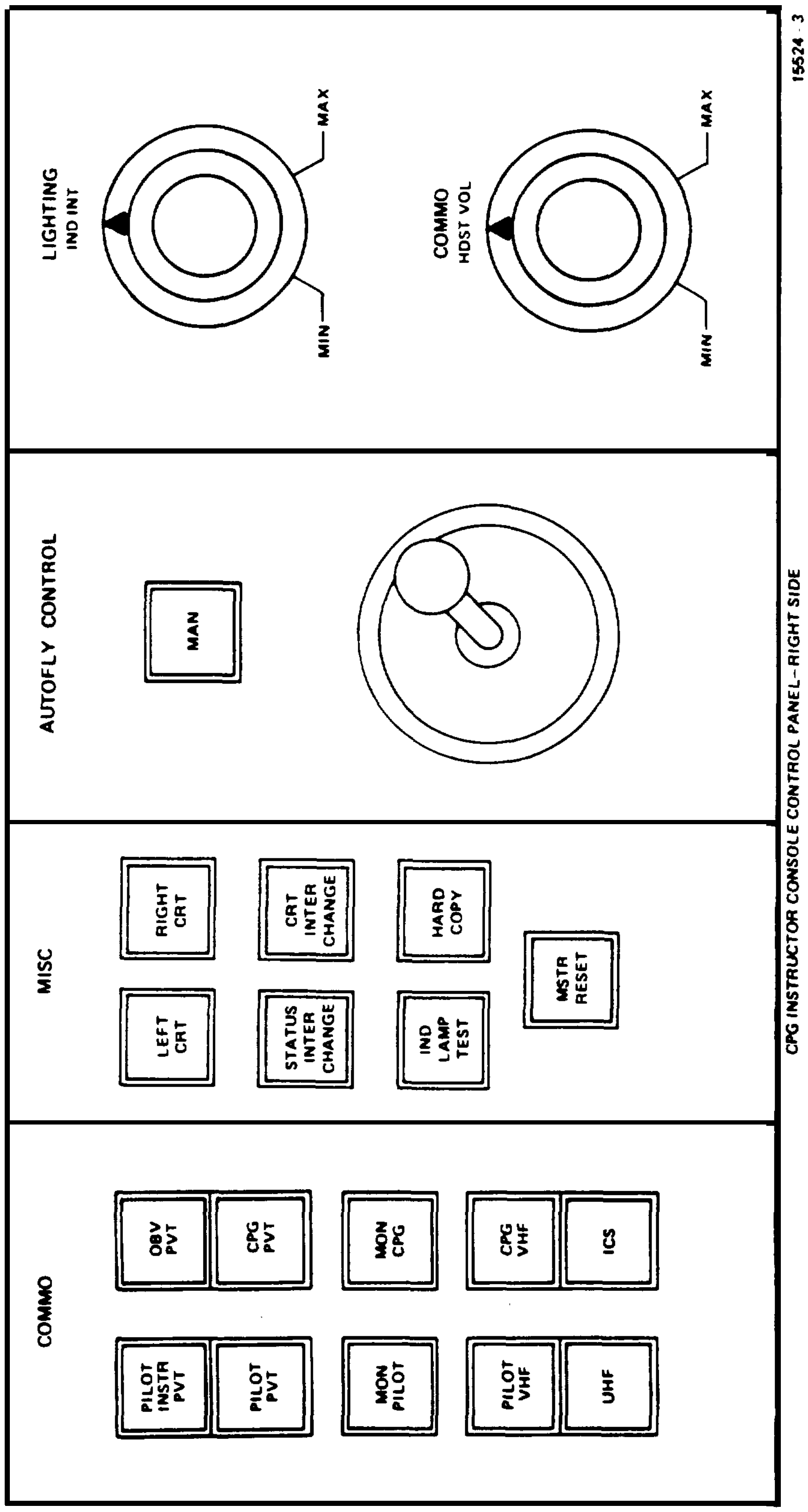
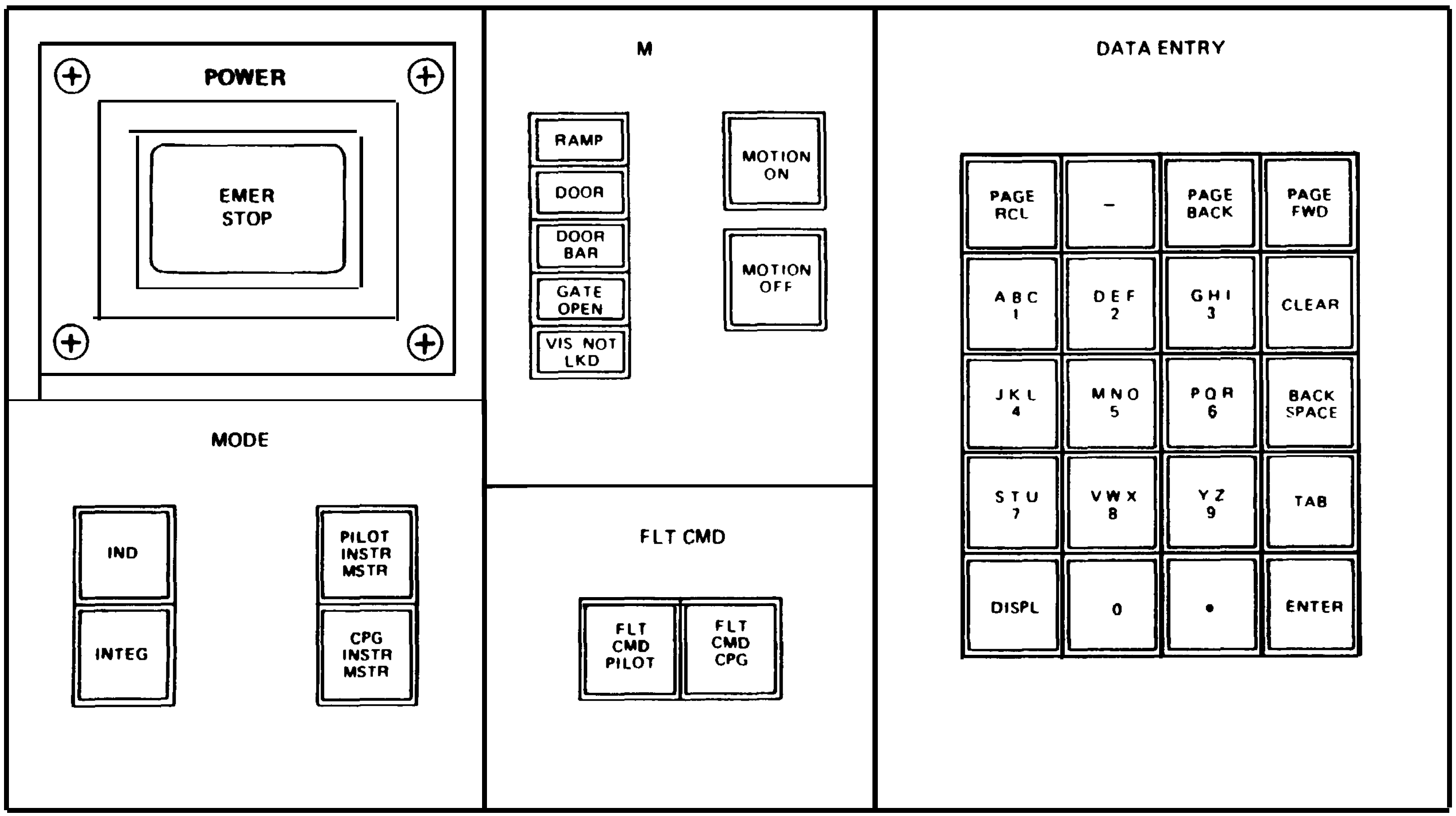


Figure 2-3. Pilot/CPG IOS console control Panels (Sheet 1)



CPG INSTRUCTOR CONSOLE CONTROL PANEL—LEFT SIDE

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Figure 2-3. Pilot/CPG IOS Console Control Panels (Sheet 2)

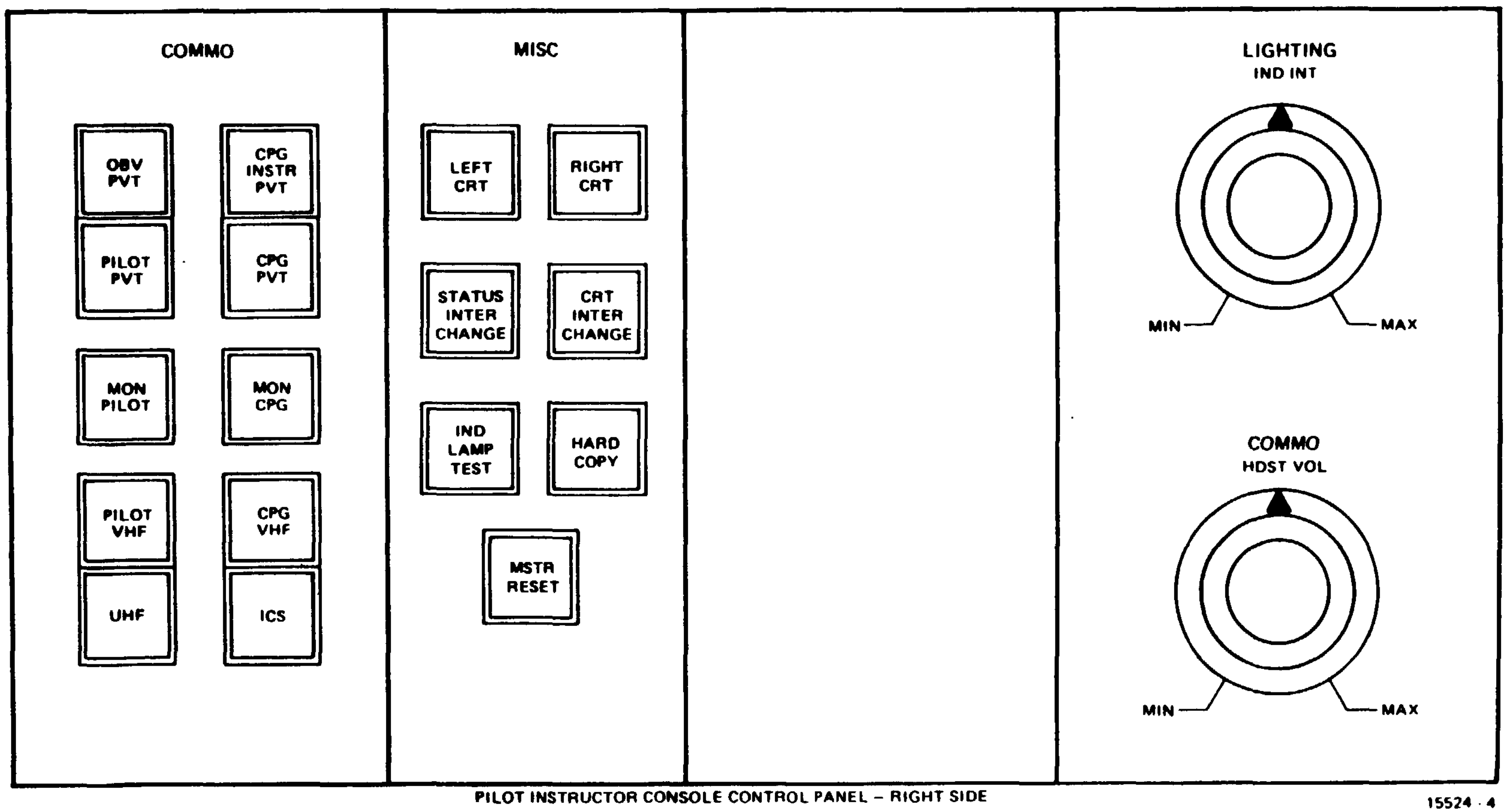
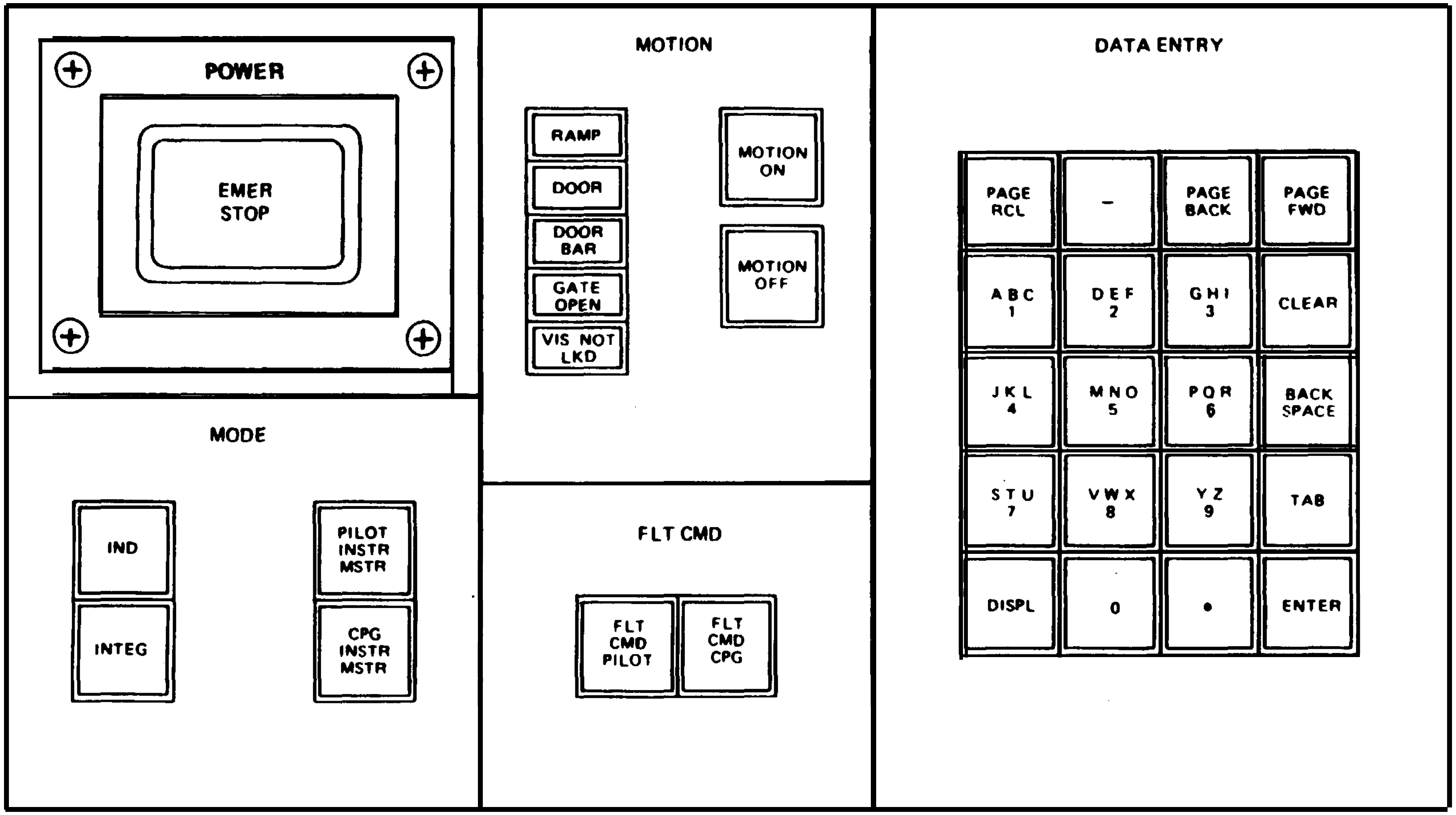


Figure 2-3. Pilot/CPG IOS Console Control Panels (Sheet 3)



PILOT INSTRUCTOR CONSOLE CONTROL PANEL – LEFT SIDE

15524 - 2

Figure 2-3. Pilot/CPG IOS Console Control Panels (Sheet 4)

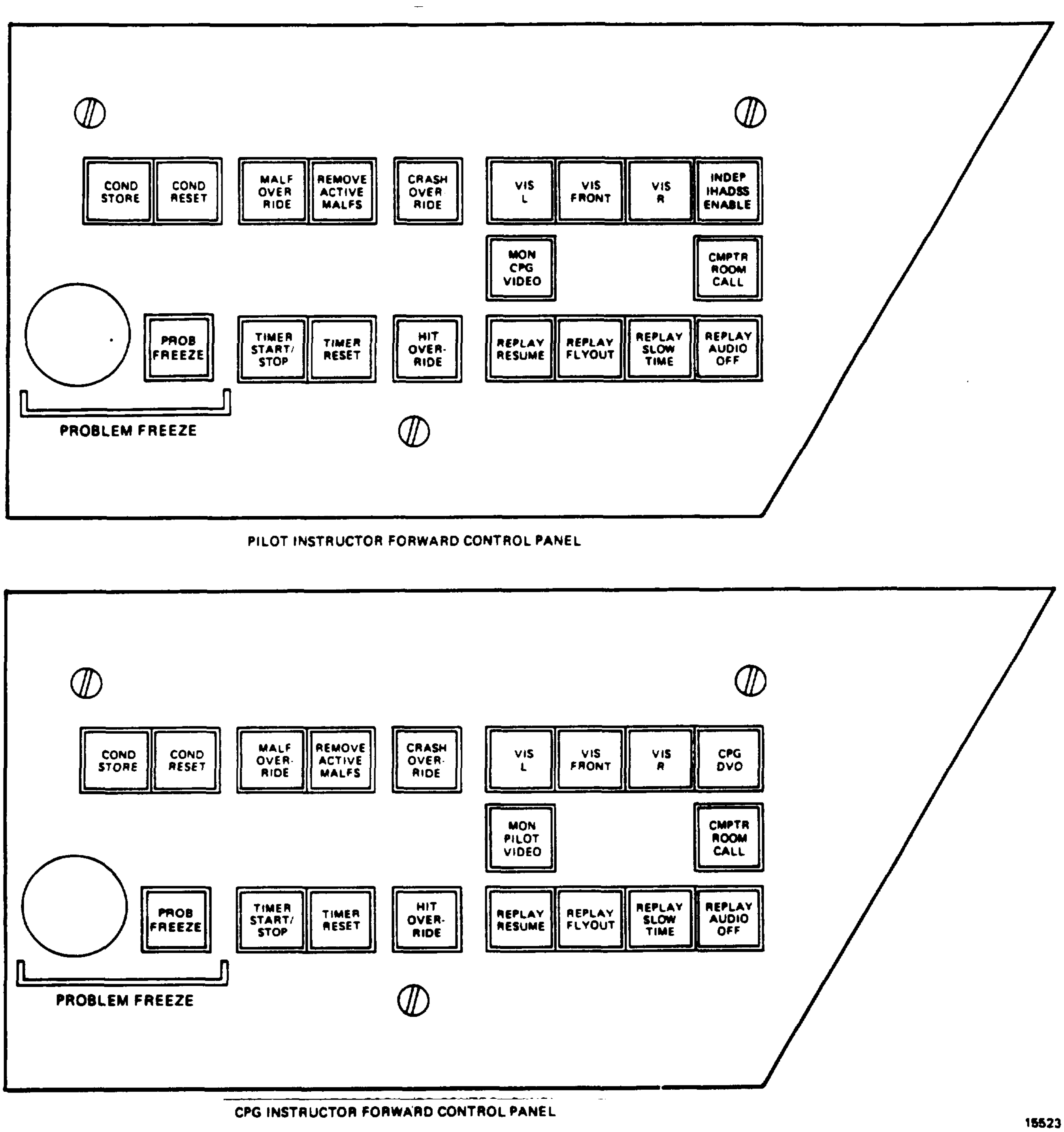


Figure 2-4. Pilot/CPG IOS Forward Control Panels

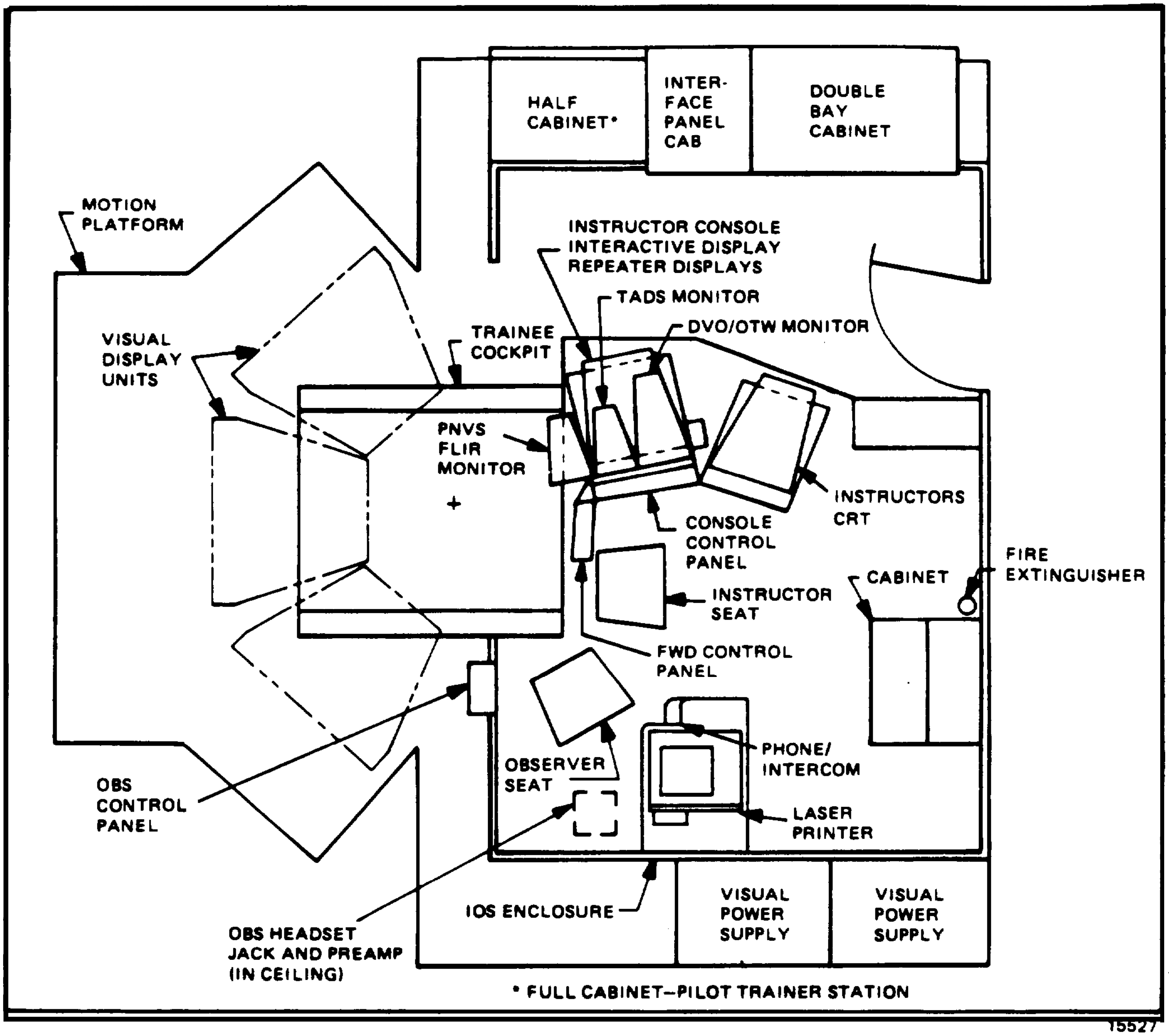


Figure 2-6. Trainee Station

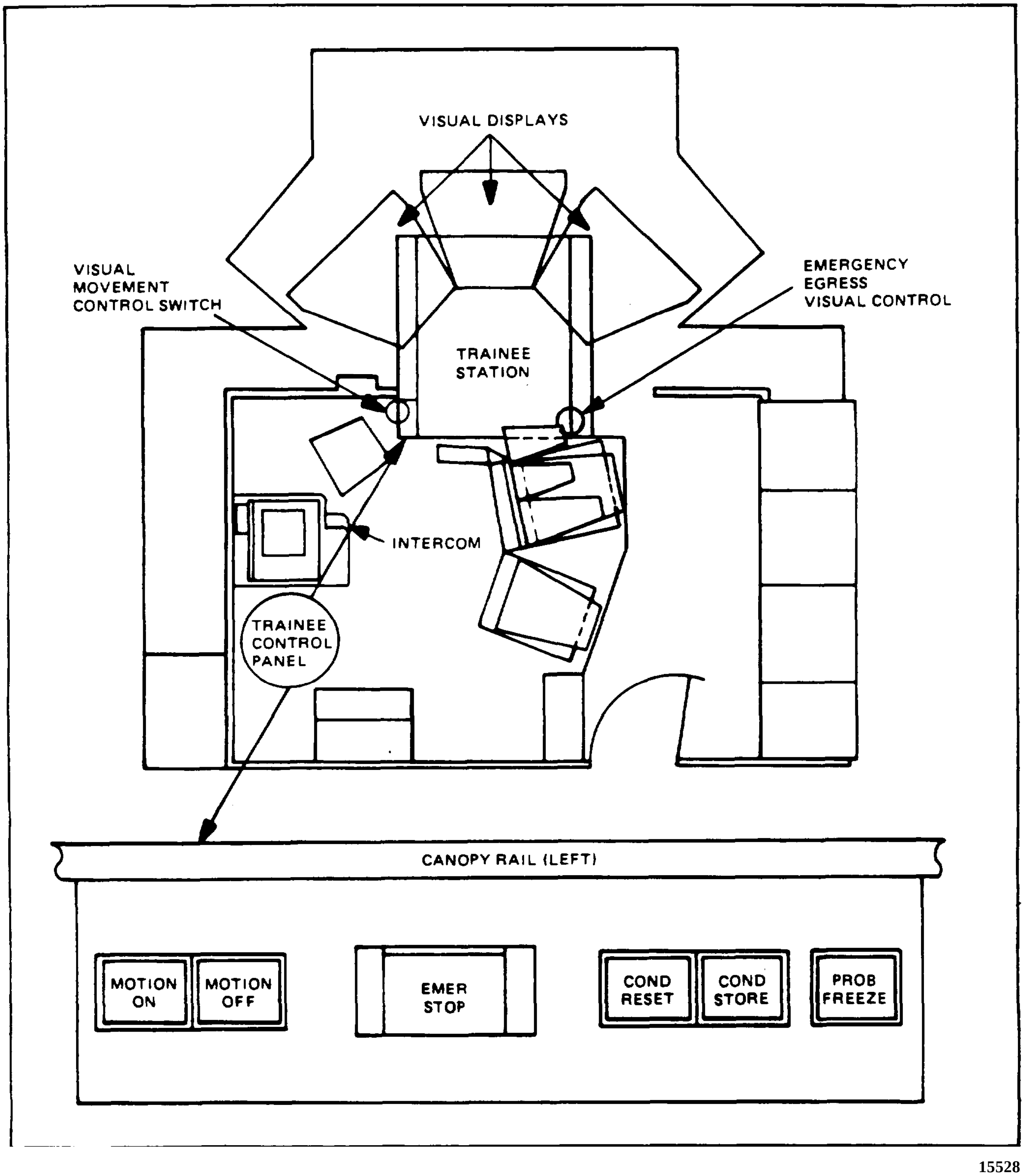


Figure 2-7. Trainee Control Panel

2-12. IOS AREA LIGHTING. The IOS area is provided with a variable-intensity overhead light, map light, and clip-on light to provide ambient illumination during any phase of the training. A black curtain is provided to shield the crew member station from IOS lighting.

2-13. INSTRUCTOR INTERCOMMUNICATION SYSTEM. Headset cords and microphone switches for each instructor art installed to permit minimum interference with the training function. Communication on a private basis is provided for instructors, observers, and the computer room. (A visual warning cut is provided for the instructors, and an aural warning cut is provided in the computer roar.)

2-14. TIME REFERENCES. A digital readout time-of-day clock is located above the observer control panel on the wall to the left of the IOS.

Section III. MODES OF OPERATION

2-15. GENERAL. The CMS can operate on-line in three categories: training, autofly, and demonstration. The CM can be used with the visual displays and/or motion system in operation. With two visual systems, both cockpits can have out-the-window (OTW) visual displays. The pilot or CPG cockpit can either be operated independently, or both can be operated as on a single integrated mission as crew members of the same aircraft. The CMS must be in the freeze mode to set up or edit a demonstration. Formulation of a demonstration involves recording and storing the characteristics of particular flight or mission profiles in the computer memory. An accompanying audio commentary can also be recorded and synchronized to the motion. During playback of a recorded demonstration for training, the CMS flies itself through an established mission exercise in a hands-off-the-controls condition. As the CMS reflies the mission, all motion, aural sounds, instrument indications, and visual display scenes are recreated. This can show the trainee pilot and/or CPG particular standard maneuvers special flight problems. (Further information on the demonstration category is given in Chapter 7 of this manual.) The system features available to each cockpit for the modes of both independent and integrated operation art outlined in table 2-l.

2-16. TRAINING. The administration of training to trainees occupying the pilot or CPG cockpits is under the positive control of the instructor. For independent modes, the instructor can employ autofly with automatic performance recording, precorded demonstrations. Initial conditions, preprogrammed malfunctions, or other aids through the use of controls and CRT displays provided at the IOS. Information to be displayed at the IOS is updated continuously during the training program to reflect current status.

a. Independent Training. In the independent mode, each instructor is free to control any of the manual features of the CMS. This includes inserting own cockpit malfunctions, changing initial conditions, current conditions and weapon loading configurations, and selection of nav/comm equipment and facilities. In addition, a training session can be frozen, and a 15-second to 5-minute dynamic playback of the current transpired flight conditions is available for review.

b. Integrated Training. In the integrated mode, the administration of training to the trainees in both cockpits is under the positive control of either the PLT or the CPG instructor. The controlling instructor controls the manual features of the CMS. This includes inserting malfunctions, changing initial conditions, selection of nav/comm equipment and facilities, and all aspects of training. The other instructor generally acts as an observer and has use of only the emergency controls, hardcopy requests, timer, and CRT display select (without editing capability). All aspects of training in the integrated mode can be accomplished without the other instructor present.

2-17. AUTOFLY. The need for a pilot at all times is overridden by the use of the automatic flight mode of operation. When the CPG cockpit is operated in the independent mode, the CMS flies itself to compensate for the missing pilot. The autofly feature flies the copilot/gunner through a prerecorded aircraft maneuver, or series of maneuvers. When active in the autofly mode, the CMS performs as if a pilot were actually flying the aircraft. During the autofly, the instructor can interrupt the flight and assume manual control of the simulated aircraft heading and altitude (i.e., act as the pilot). By doing so, the CPG is allowed additional time, if needed, to operate sensor, sighting, and weapon systems.

Table 2-1. Integrated/Independent Operation Features

Integrated	Pilot independent	CPG independent
a. Recording or editing a demonstration.	a. N/A	a. N/A
b. Demonstration playback -preprogrammed audio, slow-time, and pause.	b. Automated flight with preprogrammed audio, slow-time. and pause. System dots not respond to trainee control inputs.	b. Automated flight with preprogrammed audio, slow-time. and pause.
c. N/A	c. N/A	c. Automatic flight with preprogrammed audio, visual, and movement.
d. Dynamic recording/ performance play-back - with audio (no audio in slow-time).	d. Dynamic recording/ performance playback - with audio (no audio in slow-time).	d. Dynamic recording/ performance play-back - with audio (no audio in slow-time).
e. Program variation and controls -	e. All	e. All
Malfunctions Initial conditions Zeroing Environmental conditions Nav fail Parameter freeze Problem freeze Refuel/arm Threats	MASTER IOS ONLY	
Hardcopy Timer	ROTH IOS	
Display select (Limited to editing malfunctions)	SLAVE IOS	

2-18. DEMONSTRATION. For demonstration playback, the instructor can select a number of prerecorded demonstrations. Each demonstration can be further subdivided into nine separate maneuvers. These individual maneuvers can be selectively accessed, or they can be rearranged to formulate one mission for playback. Synchronized audio accompanying the demonstration is not available to the pilot or CPG compartment if the other instructor has already chosen the same demonstration with audio . The instructor can delete a demonstration at any point.

Section IV. TRAINING CAPABILITIES

2-19. GENERAL. The CMS is a fully operational combat mission simulator with separate pilot and CPG simulator compartments. Each has its own six degree-of freedom motion system, visual system, and instructor/operator station. Each cockpit station duplicates its portion of the actual helicopter cockpit configuration. The CMS simulates, in real-time, applicable normal and emergency aircraft operation with respect to both transient and steady-state flight conditions. Operation of the CMS involves such capabilities as engine performance, flying qualities, weapons systems performance and operation, aircraft systems performance and operation, radio communications and navigation systems performance and operation, environmental effects, nap-of-the-earth operation, and flightpath. Simulation is reflected by appropriate trainee and IOS station instrument and aural indications, aircraft control reactions, visual cue presentations, and display traces responding to trainee, instructor, and computer-programmed control inputs. Use of the CMS when the visual and/or motion system is inoperative severely limits training capabilities.

2-20. TRAINING OBJECTIVES. The CMS can be used to provide transition training proficiency flying, and weapons delivery practice. The CMS can also be used to train pilots to perform all normal and emergency flight maneuvers, weapons delivery operations, nap-of-the-earth flight and navigation, and starting, runup, and shutdown procedures. It is capable of full mission simulation, and it can be used for training of both the pilot and CPG simultaneously on the same mission or independently on different missions. This is accomplished in either integrated or independent operating modes of visual, motion, and cockpit simulation available to both pilot and CPG in any situation. The CMS can also be used for the training of instructor pilots.

NOTE

Training maneuvers are not limited to those listed in this paragraph.

a. Basic Maneuvers. Training for the following basic aircraft maneuvers can be conducted:

Cockpit procedures
Startup and initial hover
Hovering flight (including turns)
Traffic pattern
Normal takeoff from a hover
Normal takeoff from the ground
Normal approach to a hover
Normal approach to the ground
Straight-and-level flight
Level turns
Straight climbs and descents
Turning climbs and descents

b. Advanced Maneuvers. Training for the following advanced aircraft maneuvers can be conducted:

Maximum performance takeoff
Steep approach
Basic autorotation (power recovery and termination with power)
DASE OFF (digital automatic stabilization equipment) flight
Running landings
High-speed flight

High-speed dive (normal)
High-speed dive (steep)
Running takeoff
Night operations

c. Emergency Maneuvers. Training for the following emergency aircraft maneuvers can be conducted:

Forced landings (normal and high speed)
Autorotative glides and turns
Decelerations
Simulated tail rotor control failure
Simulated hydraulic failure
Transient torque control
Emergency procedures (including emergency shutdown procedures)
Autorotations with turns (power recovery, termination with power, touchdown)
Hovering autorotation
Basic autorotations (power recovery, termination with power, touchdown)
Low flat glide autorotation
Low-level, high-speed autorotation (with power recovery, termination with power, touchdown)

d. Nap-of-the-Earth Maneuvers. Training for the following low-level nap-of-the-earth (NOE) aircraft maneuvers can be conducted:

Low-level navigation techniques
Hovering in and out of ground effect
NOE takeoff
NOE flight
NOE approach
NOE downwind takeoff
NOE downwind flight
NOE downwind approach
NOE navigation
NOE radio procedure
NOE quick stop
Masking and unmasking techniques
Scan and detection techniques

e. Gunnery Maneuvers. Training for the following tactical gunnery maneuvers can be conducted:

Weapons cockpit procedures
Internal Boresight setting
Diving fire
Running fire
Diving to running fire
Low-level/NOE firing (combat sight setting)
Low-level/NOE firing

2-21. SIMULATION SYSTEM CAPABILITIES. Capabilities of the various areas and systems of the CMS are outlined below.

a. Visual Area Navigation. A simulated area of terrain 32 km by 40 km contains 28 navigation aids (radio stations).

b. Nav/Comm Radio. Navigation and communication radio capabilities are provided in Chapter 3.

c. Tactical Environment. Any of 15 different weapon loading configurations are available for firing at 10 active targets, five of which can be moving, selected from the targets available. Appropriate weapon effects are used to enhance own weapons targets and threats.

d. Atmospheric Environment. The simulated environment can be controlled by the instructor to provide variable winds, turbulence levels (light, moderate, severe), gusts, temperature, and barometric pressure. Temperature in degrees centigrade and barometric pressure in inches of mercury are displayed on the instructor/operator station (IOS) and are referenced at mean sea level. The indications presented on the cockpit instruments, and as seen by the computer, are pressure altitude and temperature based upon application of standard lapse (2°C/1000 feet).

e. Motion Cues. A six-degree-of-freedom motion base provides motion cues of pitch, roll, yaw, heave, longitudinal, and lateral. The simulation is further enhanced by a seat vibration system for both the pilot and CPG seats. The seat vibration system can provide continuous and periodic oscillations and vibrations experienced during normal and emergency flight conditions, including progressive malfunctions. Both motion and vibration can be selected or deselected at the IOS console CRT.

f. Environmental Sound Cues. Environmental sound cues are available at five levels of loudness and can be selected and varied at the IOS console CRT.

g. Seat Positions. Each flight simulator compartment provides seat positions for one trainee, an instructor, and an observer.

h. Special Capabilities. The CMS has some limitations that preclude its utilization for training in certain maneuvers. The most serious limitation is in the area of visual field-of-view required for contact flight. On the other hand, the CMS provides the following unique capabilities that the operational aircraft cannot provide:

(1) Freeze simulator action at any instant.

(2) Initiate a training program at any one of 45 predefined locations within the game environment from which the flight can proceed.

(3) Reset to an initialization point that has been modified.

NOTE

Reset is identical to initialization, indicated by freeze indicator blinking.

(4) Override an impending aircraft crash.

(5) Dynamically record and play back up to previous 5 minutes of a current flight.

(6) Insertion of up to 15 of approximately 336 malfunctions simultaneously.

(7) Demonstrate prerecorded maneuvers automatically.

(8) Independent CPG task accomplished with the use of AUTO FLY.

(9) Monitor program progress and trainee performance.

(10) Freeze flight parameters selectively.

(11) Administer audio briefings automatically.

(12) Stop and abort a program at any time in event of emergency.

(13) Retrieve stored performance data via hardcopy printer/plotter.

(14) Fully control training program from IOS, or limited control from trainee cockpit station.

(15) View on IOS CRT end/or obtain hardcopy time history plots of airspeed, altitude, and ground track.

(16) Alter environmental conditions that act on the aircraft.

(17) Compute and display ground-controlled approach (GCA) commands.

(18) Train pilot and CPG in safety.

(19) Train pilot and CPG both independently and/or simultanously.

(20) Display up to 10 interactive hostile threats.

2-22. VISUAL SYSTEM CAPABILITIES. The full-color visual simulation system, combined with computer-generated visual effects, provides a realistic view of ground and sky conditions to the pilot and CPG trainees. (Additional information on the visual system and its capabilities is contained in Chapter 6).

2-23. TRAINING TASKS. Training of pilot and CPG trainees is carried out in either integrated or independent operating modes of visual, motion, and cockpit simulation. The task of the trainees is to become thoroughly knowledgeable with all aspects of the pilot and CPG positions of the actual helicopter. The instructor task is to maintain complete control of simulated conditions for training and to fully monitor trainee performance in all normal and emergency operational aspects of the helicopter.

a. Simulated Aircraft. The M-64 Apache is a twin-turbine-engine, four-blade-rotor, high-performance attack helicopter with a two-man crew seated in tandem, the CPG in front of the pilot. The primary mission of this aircraft is that of an armed tactical aircraft with capabilities including weapons delivery, low-altitude high-speed flight, nap-of-the-earth flight, search and target acquisition, reconnaissance, multiple-weapons fire support, and troop aircraft support.

b. Flight Control. The simulated flight can be controlled by the following:

(1) By the pilot in the integrated mode with the CPG acting as CPG only, unless CPG control is selected by the master instructor.

(2) By both pilot and CRG in the independent mode, each flying completely separate and independent aircraft.

(3) By the instructor via prerecorded demonstrations in either integrated or independent modes.

c. Trainee Tasks. The task of a trainee in the CMS is to learn, practice, and verify the skills and knowledge associated with the pilot and CPG positions on the actual helicopter. The CMS provides transition training, proficiency flying, weapons delivery practice, and the training of instructor pilots.

(1) through (3) (Deleted)

d. Instructor Tasks. The task of the instructor is to facilitate and verify learning by the trainee crew. Instructional and operational functions include:

(1) Selection of mission or lesson plan.

(2) Preflight briefing of trainees.

(3) Demonstration of proper techniques and procedures.

(4) Observation, monitoring, and critique of trainee performance.

(5) Evaluation of individual or crew training needs.

(6) Identification of areas that need coaching or more special practice.

(7) Scheduled structuring of subsequent practice.

(8) Preproblem setup of helicopter configuration and position.

(9) Setup and modification of environmental conditions.

(10) Random insertion and removal of simulated malfunctions.

(11) Hardcopy recording of important aspects of trainee performance.

(12) Monitoring and controlling operational status of simulator.

(13) Serving as an air traffic controller when appropriate.

(14) Act as other factors, i.e., remote designator on the battlefield.

(15) Act as controller for threat forces.

e. Automation of Instructional Functions. Many facets of the functions noted above have been automated, thus unburdening the instructor. An additional value of this automation is the standardization it provides. Among the more important features of the CMS in terms of automating instructor function are the following:

(1) Demonstration maneuvers. Demonstration of maneuvers and problems for the CPG in which previously recorded pilot data is played back is available.

(2) Autofly maneuvers. When operated in the independent mode, the CMS is flown for the CPG through a prerecorded maneuver or series of maneuvers. This enhances the role of the CMS by performing for the CPG trainee without the presence of the pilot.

(3) Ground-controlled approach (GCA). Proper GCA instructions based on the simulated position are displayed on the IOS CRT. This enables the instructor to simply read them, rather than having to interpret graphic displays.

(4) Trainee scoring and evaluation. Evaluation data is available to the instructor from CRT displays and from direct observation of the trainees and their instruments and indicators.

f. Briefing. Briefings prior to training missions are live. In this manner, the trainees are provided with an up-to-date report of what is expected throughout the mission. Also, any unclear areas of the operation can be resolved with a question-and-answer session prior to beginning.

g. Critique. While a critique of trainee performance after a training exercise is not automated, it can be based on a comprehensive and standardized set of criteria. The critique is aided by the available hardcopy records of trainee performance. Such pictures are often worth the proverbial thousand words of instructor comment. A learning feature that can be most useful in critiquing is the 15-second to 5-minute dynamic playback of trainee performance. This can be accomplished either in real-time or in slow-time. Another function is the hardcopy print of graphic displays available at instructor discretion.

h. Cueing. Cueing is sometimes defined as the provision of stimuli, usually of a secondary or faint nature, that guide the trainee to the correct response. Such cueing, sometimes called prompting, is of considerable value in programmed instruction. Application of prompts, or cues, are gradually withdrawn or faded as learning progresses. Cueing has a somewhat different meaning in the context of the

CMS. Cues for action are the stimuli normally present in helicopter flight, such as instrument and indicator readings, positions of cockpits controls, aspects of the out-the-window visual scene, cockpit motion and vibration, feel of the controls, and sounds associated with helicopter operations. These cues are simulated with a high degree of realism.

i. Feedback. Feedback to the trainee concerning the adequacy of the performance is provided in two ways: from the pattern of cues resulting from control reactions in the course of operation of the simulated helicopter, and from the measures of performance that can be made available after a training exercise. Feedback during the exercise is provided by the cueing methods as described above. Feedback after the exercise is provided by the scoring and evaluation hardcopy records.

Section V. SYSTEMS SIMULATED

2-24. GENERAL. The aircraft systems simulated by the CMS are outlined in the following paragraphs. Since each aspect of pseudo real-time simulation employs unique hardware and computer software programs to implement them, simulation details are not provided.

2-25. ACCESSORY SYSTEMS. The following aircraft accessory systems that provide operational status to the trainee are simulated by software via computer control:

Auxiliary power unit (APU)	Instrument indications
Engine - fuel	Weight and balance
Engine - oil	Navigation and communication
Fuel supply	Armament
Transmission - oil	Flight controls
Power train	Outside environment
Rotor	Day, dusk, or night conditions
Electrical power system	Digital automatic stabilization equipment (DASE)
Hydraulic system	

2-26. SOUND SIMULATION. Analog generation under computer control provides the following sound simulation cues:

a. Aircraft Sounds. The following aircraft sounds are simulated:

Engine	Hydraulic pumps
Transmission	Environmental control system (ECS)
Main rotor	Forward avionics bay (FAB)
Aerodynamic airflow	Taxi
APU	Threat weapons
Electrical generators	Crash

b. Weapon Sounds. The following weapon sounds are simulated:

Aerial rocket control system (ARCS)
Point target weapon system (Hellfire)
Area weapons (M-230E1, 30-mm cannon)

2-27. MOTION SIMULATION. An electrohydraulic-actuated 6-post synergistic 6-degree-of-freedom (6-DOF) motion system under computer control provides the following cues:

Longitudinal displacement/onset cues
Lateral displacement/onset cues
Heave displacement/onset cues
Roll attitude/onset cues
Pitch attitude/onset cues
Yaw attitude/onset cues
Turbulence effects
Rotor out-of-track/balance effects

2-28. VIBRATION SIMULATION. An electrohydraulic seat shaker is used to transmit vibrational effects to the trainees while isolating the effects from other compartment-mounted hardware and occupants.

2-29. COCKPIT INSTRUMENTATION SIMULATION. All cockpit instruments and controls simulated are actual modified aircraft instruments. They accept outputs from dc analog circuitry under computer control and respond with the desired deflections or rotations. Three basic types of circuitry are used to drive the following classes of instruments:

Meter movement instruments
Servo instruments
Synchro instruments

2-30. RADIO COMMUNICATION AND INTERCOMMUNICATION SYSTEM (ICS) SIMULATION. The radio communications, guidance, and ICS systems simulated are listed and described in Chapter 3.

2-31. MALFUNCTION SIMULATION. There are 336 insertable, simulated malfunctions available. These malfunctions are divided into five systems: flight, circuit breakers, communications, tactics, and navigation. (Refer to tables 7-15 and 7-16 for listing and descriptions).

2-32. CONTROL LOADING. The control loading system provides a realistic and responsive feel to the simulated helicopter flight controls. Electrohydraulic units combined with a mechanical linkage system produce control initiating and reactive forces. Feedback from the simulation computer results in appropriate motions of the aircraft in flight. During a demonstration playback, the cockpit flight controls are driven by the computer and appropriately positioned in response to the motion of the aircraft.

WARNING

Flight controls may move abruptly upon system turn-on, initial conditions insertion, demonstration maneuvers or conditions store/ reset. Keep clear of controls until neutral position is reached.

2-33. ARMAMENT SYSTEMS. Simulation for the following armament systems is provided:

M-230E1 30-mm area weapon system
HELLFIRE missile system
M-261 19-tube FFAR rocket launcher
Integrated helmet and display sight system (IHADSS)
Pilot night vision system (PNVS)
Optical relay tube (ORT)
Target acquisition and designation system (TADS)
Laser rangefinder/designator
Laser tracker
Video display unit (VDU)
Video recorder system (VRS)

CHAPTER 3

AVIONICS

3-l. GENERAL. Simulation for all onboard avionics equipment utilizes actual aircraft panel hardware backed up by applicable analog and digital processing and driver circuitry, all under computer control. Operation of nearly all panel controls and indicators is simulated to depict actual equipment functions. (Table 3-1 lists the avionics systems that are simulated in the CMS).

3-2. COMMUNICATIONS EQUIPMENT. Simulated radio communications are such that the two-way communication primarily takes place between the trainee(s) and the instructor(s). At the same time, electronics interfacing with the computer, which defines and controls some of the variables, allows for complete system flexibility. System power controls and indications, aircraft flight parameters, and simulated equipment failure commands are brought into the computer for processing. From these inputs, the necessary commands are then generated for the avionics and system-related equipment.

3-3. NAVIGATION EQUIPMENT. Navigation systems and equipment provide location and course-related information to the pilot and CPG via radio receiving links and instrument panel indications.

3-4. RADAR AND TRANSPONDER EQUIPMENT. The radar and transponder equipment is limited in simulation to provide status indications to either the pilot trainee or the instructor.

Table 3-1. Avionics Systems

Class	Nomenclature	Use
Intercommunication	Intercomnunication System C-11746(V)/ARC Remote Transmit Select Switch Indicator ID-2403/ARC RTSS	Intercommunication between crewmembers and control of navigation and communica- tion radios. Remote transmit select switch.
FM/AM Communication	Radio Set AN/ARC-186(V) VHF-FM/AM No. 1	Two-way FM voice communica- tions: FM and continuous- wave homing in the freq- uency range 30 - 87.975 MHz plus AM 118 - 152 MHz.
FM/AM Comnunication	Radio Set AN/ARC-186(V) VHF-FM/AM No. 2	Same as No. 1 VHF-FM set except no homing capability.
UHF Communication	Radio Set AN/ARC-164(V) UHF-AM	Two-way voice comnunication with Have Quick function of in the frequency range 225 through 399.95 MHz.
Voice Security System	TSEC/KY28 C-8157/ARC	Secure communication for pilot FM radio.
Automatic Direction	Direction Finder Set	Radio range and broadcast reception; automatic direction finding and homing in the frequency range of 100 to 3000 kHz.
Lightweight Doppler Navigation Set (LDNS)	Doppler Navigation Set AN/ASN-128	Provides present position or destination navigation information in latitude and longitude (degrees and minutes) or universal transverse mercator (UTM) coordinates.
Identification Friend or Foe	Transponder Set AN/APX100(V)	Transmits a specially coded reply to a ground-based IFF radar interrogator system.
Absolute Altimeter	Radar Altimeter AN/APN-209	Measures height above ter- rain or above ground level (AGL).
Heading and Attitude Reference Set	LR-80 HARS	Senses helicopter attitude and motion to define roll, pitch, heading, and flight- path.

CHAPTER 4

TACTICS

4-1. GENERAL. The CMS, having full mission tactical weapons capability, enables the pilot and/or CPG trainee to practice and improve proficiency in missions involving missile and rocket delivery and gunnery exercises. The following armament systems and components are simulated and interfaced with the computer via signal-conditioning equipment:

M-230E1 30-mm area weapon system
Point target weapons system (Hellfire)
Integrated helmet and display sight system (IHADSS)
Optical relay tube (ORT)
Pilot night vision system (PNVS)
Aerial rocket control system (ARCS)
Target acquisition and designation system (TADS)
Laser rangefinder/designator
Video display unit (VDU)
APR-39 radar warning receiver
ALQ-136 radar jammer
ALQ 144 IR jammer
M-130 chaff dispenser
Video recorder system (VRS)

4-2. VISUAL SIMULATION. The simulated environment consists of out-the-window displays for the pilot and CPG trainees with tactical targets in the visual scene. Scorable targets of opportunity are provided in the visual scene at selected locations in the form of military vehicles or missile launching sites. The display also portrays such weapon effects as rocket and missile flightpaths, weapon burnout, target or ground impact. The sensor displays also present similar effects for the pilot and CPG trainees with appropriate field-of-view and sensor-sighting directions. Reticles and symbology are included as necessary.

4-3. TRAINING. To initiate a problem, the pilot or CPG instructor can choose selected targets as movable targets that will be displayed on the ORT or out the window. Velocity is under instructor control, and direction of the moving targets is along predetermined pathways in the visual scene. Weapon loading is carried out by the instructor by means of IOS console CRT/keyboard action. There are 15 different weapon loading configurations available. The current status of remaining armament is presented on one of the IOS CRT status area and is based on the initial conditions of the weapon loading configuration and weapons previously fired.

4-4. EVALUATION. The instructor is provided with weapon scoring data on a CRT page. The displayed data provides the number of rounds fired, hit/miss status, and miss distances, displayed as distance, long or short, left or right, and high or low, where applicable. The aural cue system provides for simulation of normal and abnormal sounds that make up the cockpit acoustic environment. Weapon sounds include: ARCS, Hellfire, and area weapon system 30-mm guns.

CHAPTER 5

OPERATING LIMITS AND RESTRICTIONS

5-1. GENERAL. The CMS has a high degree of similarity to the actual helicopter. Since the purpose of the CMS is for individual and crew proficiency and tactical training, certain operations and functions of the aircraft are simulated only partially or not at all. Those operations and functions that follow were determined to have very low or no applicability for the enhancement of pilot and CPG training and proficiency. General items include the following:

Transparent canopy plexiglass is not present
Canopy removal arm/fire mechanisms are installed but nonfunctional
Pilot lighting control panel is functional but limited

5-2. AVIONICS. Comnunications equipment provides for instructor and trainee communications, but not actual signal reception or transmission. Discrete frequency radio communications channels are not available. (Additional limitations that exist with the avionics equipment are described in Chapter 3.)

5-3. TEMPERATURE AND HUMIDITY. The simulator compartments and motion systems are required to operate in a comfort-controlled environment at a temperature of 75 (±10)°F (18.33 to 29.44°C) at a 50 (±5)% relative humidity. The computer complex is required to operate in a controlled environment of 70 (±5)°P (18.33 to 23.88°C) at a 50 (±5)% relative humidity.

a. In the course of operation, variations in room temperature must not result in the development of relative humidity above 70% or below 30% at any temperature within the range from 50 to 100°F (10 to 38°C). Temperature sensors in the equipment cabinets are capable of sensing two overheat temperatures. At 100°F (38°C). they Illuminate a light on the failure indications panel indicating that a particular cabinet location is in an overheat condition. In addition, an aural warning is activated. If the overheating condition is not corrected, the entire CMS complex is automatically shut down when the temperature exceeds 110°F (44°C).

b. The internal temperature of the pilot and CPG CMS compartments is controlled by separate, dedicated air conditioners ducted at supplementary outlets within the compartment and the normal cockpit heating and defrosting ducts. Separate thermostat controls are provided on the inside rear wall of each compartment. The cockpit air temperature controls, although present, are nonfunctional.

5-4. OCCUPANCY. During simulated maneuvers, safety reasons require that occupancy of each flight compartment is limited to three persons: the trainee, an instructor, and an observer. Use of seat belts is mandatory while in motion.

5-5. MOTION SYSTEM. For multiaxis motion, the maximum platform excursion values are given below with respect to a forward reference point. These values are measured with respect to an origin established when the motion platform is considered to be at a neutral position: that is, with the hydraulic cylinder legs at midposition:

Vertical	33 inches up, 38 inches down
Lateral	±58 inches
Longitudinal	±53 inches

Pitch	31° down, 36° up
Roll	±32°
Yaw	±32°

5-6. VISUAL SYSTEM. Two DIG systems are used in the CMS, differing only in the number of channels offered and in the hardware required related to that difference. The same software is used for both DIG's.

a. There are timing constraints or desired system performance to provide high-density scenes with DTV and FLIR images at a 60-Hz rate.

b. The DIG's consist of a three-channel DIG system and a one-channel DIG system. The three-channel system provides either a three-channel out-the-window (OTW) display or pilot night vision sensor (PNVS) video. The one-channel system provides simulation of the three target acquisition and designation system (TADS) sensors: forward-looking infrared (FLIR), day TV (DTV), and direct-view optics (DVO). Since there are only two DIG systems, there are limitations on the number of visual displays that can be viewed simultaneously. (Table 5-1 lists the displays available in each cockpit during integrated or independent CMS operations.)

5-7. AUDIO SYSTEM. Once programmed, accompanying audio cannot be turned off while a demonstration continues. Audio is not available during slow-time playback. All aural cues are limited in loudness to within established safe levels of hearing. Sounds associated with rain and hail are not provided.

5-8. IOS CRT-CONTROLLABLE PARAMETERS. The CRT display pages provide instructor control for aircraft environment, flight, and miscellaneous related parameters. Selectable values for edit are limited within the range normally found in a realistic world or within the limitations of the actual helicopter.

a. Environmental Conditions. Selections of environmental conditions are limited as follows:

Barometric pressure	28 to 31 inches Hg
Outside air temperature	-40°C to +62°C -40°F to +252°F
Wind velocity	0 to 30 knots in l-knot increments
Wind direction	001 to 360 degrees in l-degree increments
Vertical wind gust	0 to 25 knots In 5-knot Increments
Horizontal wind gust	0 to 25 knots in 5-knot increments
Turbulence level	0 to 5, 0 = off, 5 - max
Visibility	0 to 99,999 meters
Ceiling	0 to 50,000 feet
Cloud tops	0 to 50,000 feet
Scud clouds	On/off
Random visibility	On/off (available only with visibility of 2000 meters or less)
Icing enable	on/off
Horizon glow	0 to 5, 0 - off, 5 - max

Table 5-1. Visual Display Availability

CMS visual mode	Pilot OTW	Pilot IHADSS Symbol	Pilot IHADSS PNVS SYM	Pilot VDU	CPG OTW	CPG IHADSS symbol	CPG IHADSS TADS symbol	CPG ORT HOD HDD
Integrated								
1			x[a]	x[a]			x[a]	x[a]
2	x	x[a]		x[a]	x[b]	x[c]	x[c]	x
3			x[a]	x[a]			x[a]	x[a]
Independent								
4			x	x	x	x		
5	x[d]	x[d] or	x[d]	x[d]			x[e]	x

[a] Includes operational monitoring capability (when pilot selects CPG monitor while CPG has DVO selected, a monochrome version of the DVO scene is provided on pilot IHADSS).

[b] Duplicate imagery of pilot OTW.

[c] CPG views IHADSS symbology with or without TADS video.

[d] Either OTW and symbology or PNVS and VDU.

[e] Either TADS or PNVS.

b. Freezable Flight Conditions. During a training exercise, the following aircraft flight conditions are a direct result of the trainee flight inputs and are freezable only.

Altitude MSL	Position
Airspeed	Roll
Heading	Pitch
Fuel	Vertical speed

NOTE

Conditions of yaw, torque pressure, and rate-of-turn are all interdependent flight parameters that assume in-turn conditions under software control and are not freezable.

c. Editable Flight Conditions. Aircraft flight condition editable parameters are:

Fuel loading	2509 pounds maximum
Position	21s VK 80005000
	21s WK 20005000
	21s WK 20008200
	21s VK 80008200

d. Miscellaneous Conditions. Parameter limits for related conditions are:

Sound level	0 - 5, 0 = off, 5 = max
Runway lights	0 - 5, 0 = off, 5 = max
VASI	cm/off
Airbase cultural	0 - 5, 0 = off, 5 = max
Approach lights	0 - 5, 0 = off, 5 = max
Strobe	on/off
Beacon	on/off
Weapon load number	1 - 15

5-9. COCKPIT CIRCUIT BREAKERS. Circuit breakers on the ac and dc circuit breaker panels are functional and poppable.

5-10. ARMAMENT SYSTEM. Armament simulation is implemented so that the instructor must inform the trainee which weapon load configuration is in effect and that trainee actions and indications must be compatible. In the aircraft, the backup bus controller assumes the task of providing weapons data if the fire control computer (FCC) fails. In the simulator, the FCC is allowed to function and a warning light canes on to indicate the function.

5-11. Deleted.

5-12. INDEPENDENT MODE. This mode is limited as follows:

a. Demonstrations cannot be dynamically recorded.

b. Deleted.

c. Instructors/operators cannot initiate malfunctions affecting the other cockpit.

d. The CPG instructor ray select VISIONICS POINTING and REMOTE DESIGNATIONS for the CPG.

e. AUTOFLY capability is available to the CPG cockpit.

f. The CPG has radio communications with the CPG instructor over the ICS, VHF, and UHF radios regardless of their operational status.

g. The CPG cannot affect electronic warfare threat environment.

h. Deleted.

5-13. INTEGRATED MODE. This mode is limited as follows:

a. CPG visual is the same as the pilot front visual.

b. Either pilot or CPG instructor may be selected as master instructor with control and editing functions. The slave instructor has limited IOS control and editing functions. Selection of CRT page displays without edit, and motion off, emergency stop, freeze, timer reset, edit malfunctions, and hardcopy request are available to the other instructor. Master control can be assumed by or transferred to the other instructor at any time.

CHAPTER 6

VISUAL SYSTEM

6-1. GENERAL. The AH-64 CMS utilizes two digital image generation (DIG) systems to provide the necessary visual displays. A computer-generated data base provides a tactical gaming area and an airfield area of approximately 1,200 square kilometers (32 x 40 km). The gaming area is a generic terrain representation that was specifically designed to meet the diverse training requirements related to attack helicopter operations.

NOTE

> Since these are only two DIG systems provided with the CMS, there are limitations on the number of visual displays that can be viewed simultaneously. (Chapter 5 lists the displays available in each cockpit during integrated or independent CMS operations.)

a. Out-the-Window Displays. Each cockpit has three out-the-window displays (left, front, and right). In the independent mode, each cockpit requires the use of its DIG system to provide OTW scenes. In the integrated mode, one DIG provides OTW scenes to both cockpits but from the pilot's perspective.

b. Sensor System Displays. The visual generation system has the capability of providing imagery to every sensor display in the CMS. These include the pilot IHADSS with PNVS and symbology, the OTW scene, and the VDU. The pilot can also monitor the CPG TV or TADS FLIR on the VDU during integrated flight training. The CPG has displays for IHADSS and ORT heads-down display (HDD), plus heads-out displays (HOD) for TV and FLIR.

CHAPTER 7

NORMAL OPERATING PROCEDURES

Section I. CONTROLS AND INDICATORS

CAUTION

Due to abnormal shutdown possible hardware damage nay occur.

7-l. EMERGENCY STOP. Emergency stop switches are located on the various electronic cabinets throughout the CMS complex and at the trainee stations. These switches should not be used unless an actual emergency exists. Emergency stop, when depressed, removes facility power to the entire CMS complex, including the motion and visual systems.

a. The motion platform is returned to the settle position at the fastest practical speed by a quick-settle control valve if emergency stop is activated.

b. Emergency stop switches are at the following locations:

Instructor/operator station (IOS) console control panel
Trainee control panel
Linkage cabinet
Motion cabinet
Motion pumps
Power cabinet

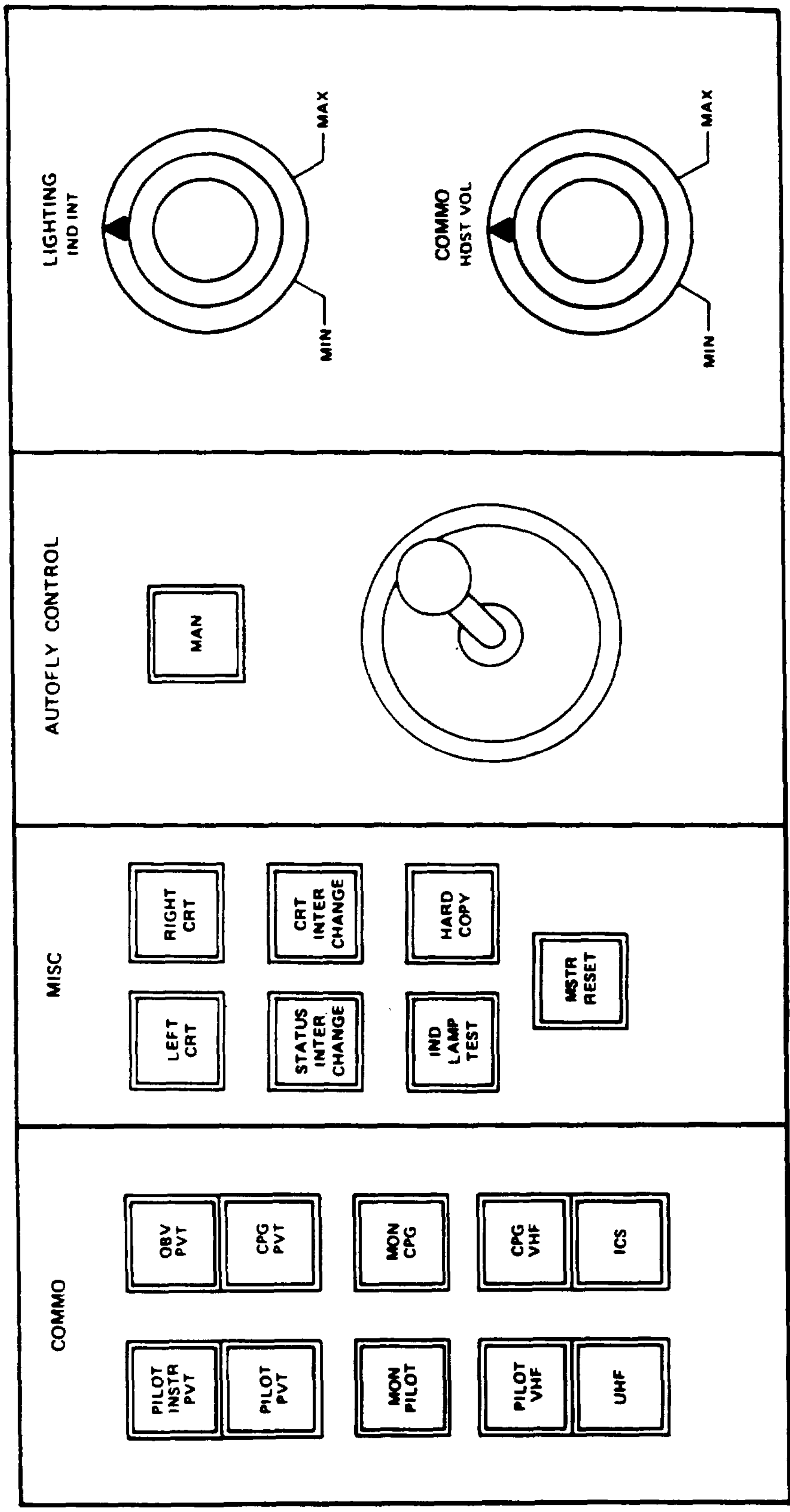
7-2. MAJOR MODE SELECT. Major mode select permits the instructor a choice of integrated or independent training mode configurations for the CMS. In the integrated mode, both CMS cockpits are electronically coupled and provide a simulated aircraft and environment for pilot and CPG training as a crew. The instructor can select and designate from which IOS station to conduct and manage training. This decision is based upon what the specific training objectives are for that training period. In the independent mode, each CMS cockpit is an independent simulated. aircraft, and training can be conducted in each cockpit without interfering with the other cockpit.

a. Four switchlights on the left side of the IOS console control panel permit the selection and designation of the major mode of operation and training configuration for the CMS. (See figure 7-1.) The switchlights are IND, INTEG, PILOT INSTR MSTR, and CPG INSTR MSTR. The IND/INTEG switchlights are used to select either independent or integrated mode of operation. If integrated mode is selected, one IOS must be designated to be the master station (PILOT INSTR MSTR or CPG INSTR MSTR). The raster station has control of the CMS instructional features that are used to establish and control the training process. When switching from independent to integrated, the master station function defaults to the CPG IOS.

b. The following characteristics are related to major mode selection:

(1) Rode changes must be requested while in problem freeze.

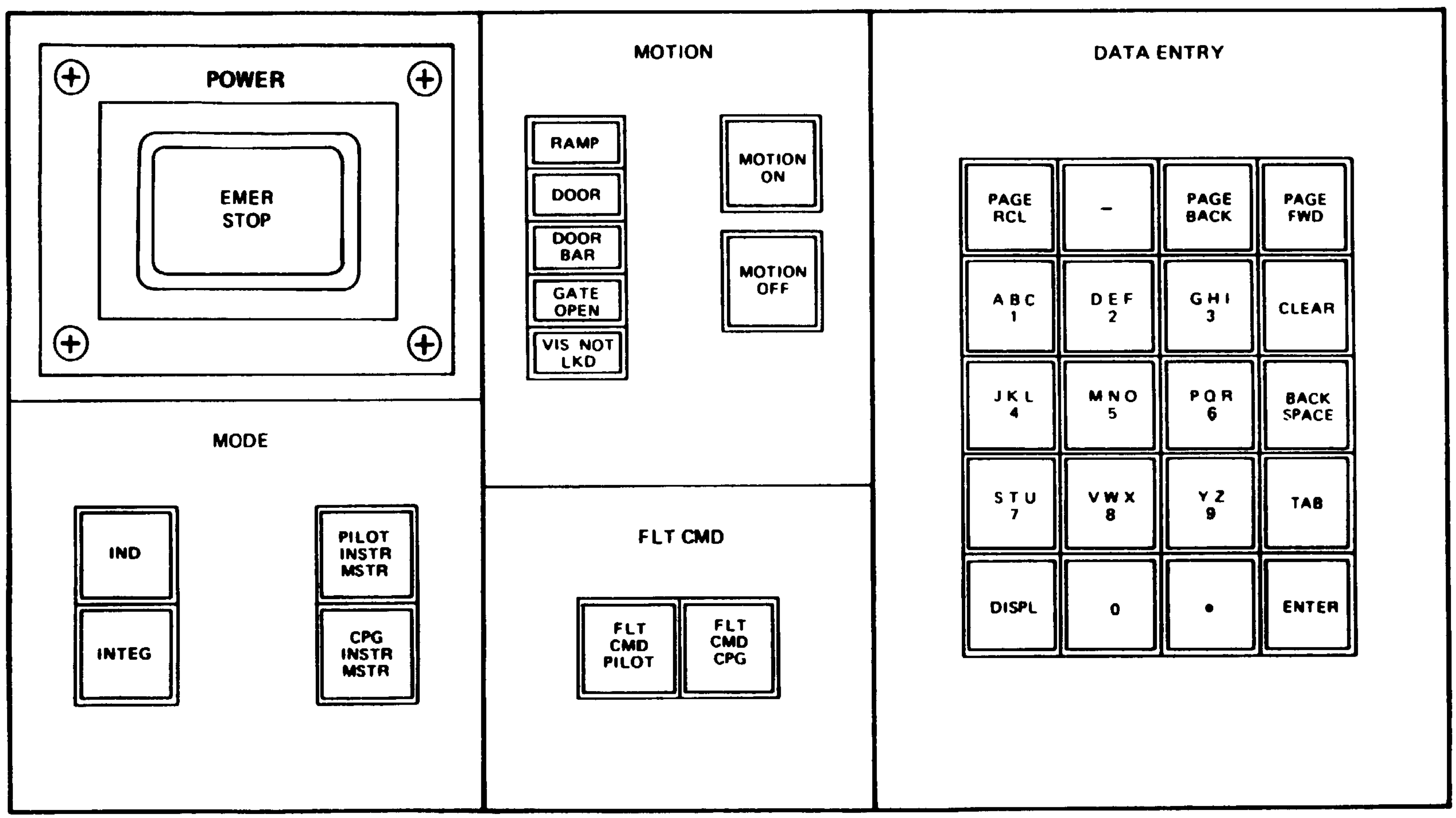
(2) When a mode change is initiated from independent to integrated or vice versa, an automatic master reset occurs; that is, all temporary modifications, TEE's, AMI's, and IC's are removed from the simulation.



15524 - 3

CPG INSTRUCTOR CONSOLE CONTROL PANEL–RIGHT SIDE

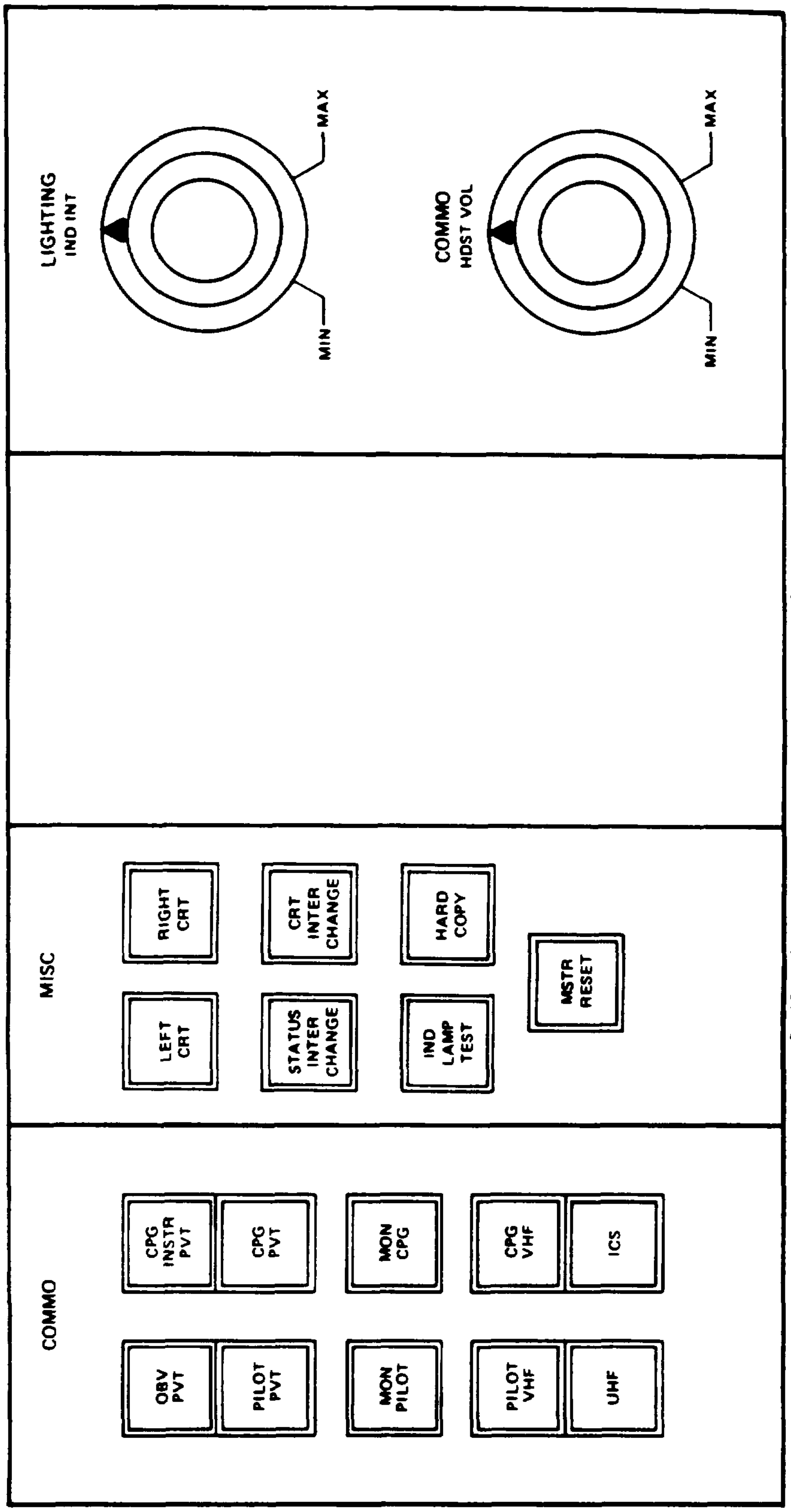
Figure 7-1. Pilot/CPG IOS Console Control Panels (Sheet 1)



CPG INSTRUCTOR CONSOLE CONTROL PANEL—LEFT SIDE

15624 - 1

Figure 7-1. Pilot/CPG IOS Console Control Panels (Sheet 2)



PILOT INSTRUCTOR CONSOLE CONTROL PANEL – RIGHT SIDE

15524 - 4

Figure 7-1. Pilot/CPG IOS Console Control Panels (Sheet 3)

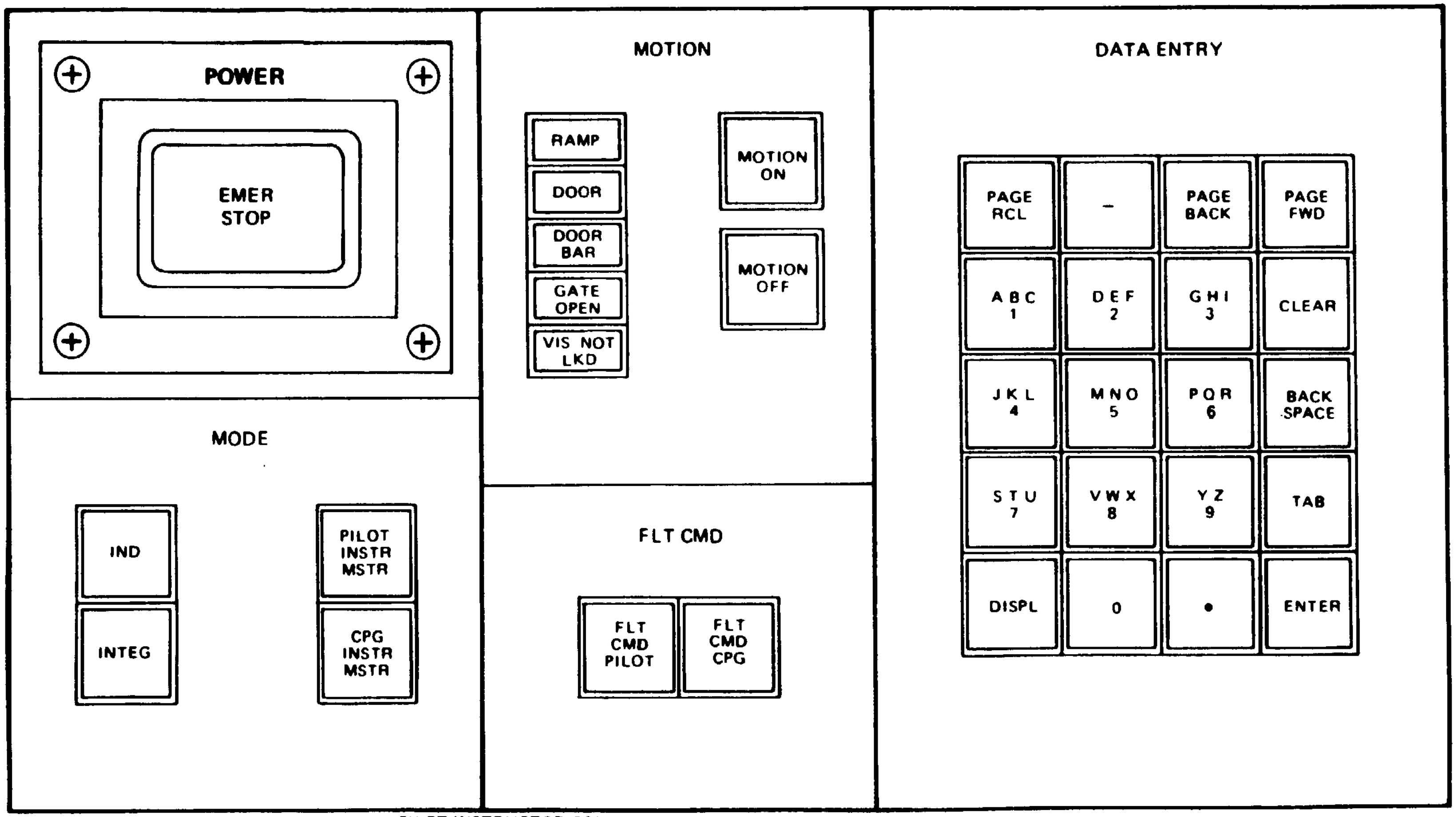


Figure 7-1. Pilot/CPG IOS Console Control Panels (Sheet 4)

(3) During integrated mode. the following switches are active only at the master IO station:

Condition store Condition reset Replay resume Replay flyout Replay slow-time Flight command pilot Flight command CPG	master station only
Master reset	
Pilot instructor master CPG instructor master Left CRT Right CRT Status interchange CRT interchange	refer to NOTE

NOTE

Either IO can select the master IO function by depressing the PILOT INSTR MSTR or CPG INSTR MSTR switchlight.

(4) In integrated mode, demos are active only at the master station.

(5) For AMI and TEE preps, the CPG IOS station must be the master.

c. The MODE select switchlights are used to prepare the CMS for crew training, to select independent training for pilot and CPG, and to designate which IOS will be the master station.

7-3. MOTION CONTROL. Motion controls are located on the IOS console control panel (figure 7-1) and the trainee control panel (figure 7-2). Incorporated with the motion control switchlights are a series of microswitch safety interlocks.

a. When the MOTION ON switchlight is depressed, the following microswitches must be closed for motion to come up:

Cockpit/instructor station entrance door
Door bar
Ramp
Right visual display
Service gates to motion areas
Cabinet doors located on motion platform
Pressure pads on platform floor

b. The motion system immediately settles to a nonerect position if any microswitch interlock is opened during flight. The IOS console control panel has interlock warning lights to indicate any open switch during flight or before motion is activated.

7-4. FLIGHT COMMAND. The flight controls (cyclic, collective, and antitorque) in each trainee cockpit are totally independent and separate systems. In the independent mode of training, each set of controls works as in two different aircraft, and the computer responds accordingly to their outputs. However, when the CMS is

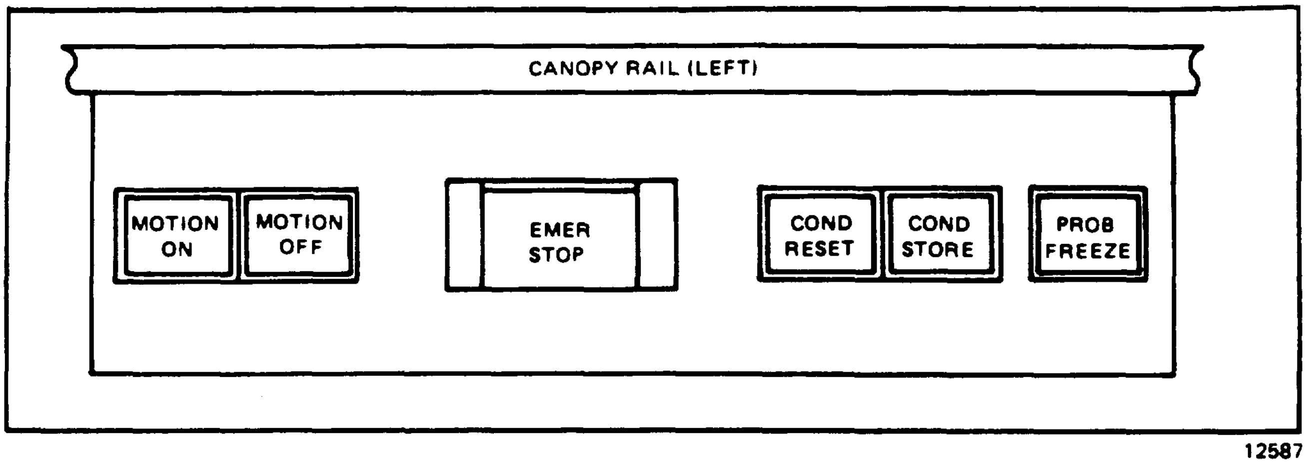


Figure 7-2. Pilot/CPG Trainee Control Panel

used in the integrated mode, separate systems do not work. The computer must know which controls to receive outputs from. The flight command (FLT CMD PILOT and FLT CMD CPG) switchlights provide this function.

WARNING

> Flight controls may move abruptly upon system turn-on, initial conditions insertion, demonstration maneuvers or conditions store/ reset. Keep clear of controls until neutral position is reached.

a. The FLT CMD PILOT or FLT CMD CPG switchlights are on the left side of the pilot and CPG IOS console control panels (figure 7-1). A discrete switchlight is provided for each trainee station. When either switchlight is depressed, the corresponding set of controls provides flight control commands to the computer; other cockpit controls are inoperative.

b. Characteristics of the flight command control system are as follows:

Active only in integrated mode
Active only at the master instruction station
Either switchlight can be activated while in freeze or on-the-fly
Inactive during playback, demos, and autofly

c. These switchlights permit the instructor at the master station to designate which trainee will physically fly the simulated aircraft.

7-5. DATA ENTRY KEYBOARD. The data entry keyboard contains a set of alphanumeric and function keys that serve as the primary means of interface between the instructor and the CMS computer system.

a. The eight function keys on the keyboard (beginning at top left in figure 7-3) are:

(1) PAGE RCL - Replaces currently displayed CRT page to which the keyboard is slaved with the most recently displayed page and displays the index and control for all pages if target status (page 30) has been fixed, using line 61 of page 150.

(2) PAGE BACK - Replaces currently displayed page to which the keyboard is slaved with preceding page of a given file (e.g., replaces page 102 with page 101 or page 101B with page 101A).

(3) PAGE FWD - Replaces currently displayed page to which the keyboard is slaved with the succeeding page of a given file (e.g.. replaces page 102 with page 103 or page 101A with page 101B).

(4) CLEAR - Removes (erases) the edit/messages line of the CRT.

(5) BACK SPACE - Backs up one space on edit line.

(6) TAB - Used as a spacer/separator between fields of data entries: permits multiple data entries to be called prior to entry. TAB also activates cueing information for subsequent data entries. This data is displayed in the edit area prior to entry. Only required for on-page editing.

(7) ENTER - Enters information typed on the alphanumeric keys into the simulation program.

(8) DISPL - Displays text/graphics as requested on the selected CRT using the alphanumeric keys.

b. The data entry keyboard has functional software that provides interpretation for numeric keypad entries. The interpreter accepts specific keypad entries as messages representing page numbers, item/line numbers, and/or data. (Table 7-l provides the keyboard interpreter message types.)

c. The following format appears in the edit area during page editing:

KEYBOARD ENTRY	NNN	NN AAAAAAAAAAAA	XXXXXXXXXX YYYYYYYYYY

NNN	= page number
NN	= item/line number
AAAAAAAAAAAAAAAA	= up to 16 digits in item label/title
XXXXXXXXXX	= up to 10 alphanumeric characters in current value or state
YYYYYYYYYY	= up to 10 alphanumeric characters in new value to be entered

d. UTM entries are two letters followed by eight or ten digits (US12345678). To enter letters via the data entry keyboard, two keystrokes must be made for each letter. The first stroke designates the location of the letter on the key and is the left, center. or right column of the numeric keys. The second stroke selects the key on which the desired letter resides. In this manner, letters can be entered. All switches inputs are read as momentary Booleans by a routine that stores characters at a sufficiently rapid rate to permit the keyboard interpreter to receive all inputs.

e. An example of letter entry is as follows (see figure 7-3):

(1) For an A entry, depress:

Key 1 for left column
Key 1 for A

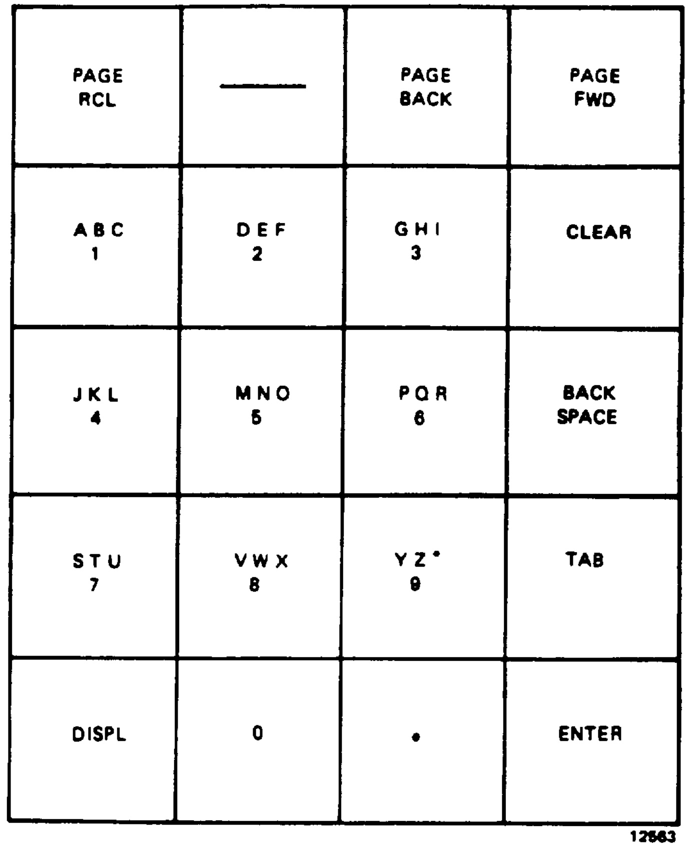


Figure 7-3. Data Entry Keyboard Control Panel

(2) For a B entry, depress:

Key 2 for center column
Key 1 for B

(3) For a C entry, depress:

Key 3 for right column
Key 1 for C

f. The data entry keyboard is on the IOS console control panel in each cockpit. The instructors can use the data entry keyboard to:

Enter, delete, or modify data
Call up CRT pages for display
Clear the edit line
Enter or delete malfunctions
Enter initial conditions
Select demonstrations, TEE's, autoflys, and record/playback
Enter UTM coordinates

Table 7-1. Keyboard Interpreter Message Types

For	Keystroke	Range of value
Index display	N DISPL	N = 0 to 9, 30
Page display	NNN DISPL	NNN = 100 to 999
Displayed page Boolean toggle	NN ENTER or NN TAB ENTER	NN = 01 to 99 NN = 01 to 99 (also displays label)
Displayed page data item change	NN TAB NN... NN ENTER	NN = 0 to 99 NN. . . NN = (1) Reference # (2) Real value (3) UTM grid
Nondisplayed page data item change	NNNOO NN ... NN ENTER	NNN = 100 to 999 00 = 01 to 99 NN. . . NN = (1) Reference # (2) Real value (3) UTM grid
	or	
Boolean feature	NNNOO ENTER	NNN = 100 to 999 00 = 01 to 99
Instructional feature activate	NNN ENTER	NNN = 100 to 999

7-6. COMMUNICATIONS CONTROLS. The instructor communications control feature permits instructors to have complete control of the various communication networks available in the CMS. The controls permit discrete communications between the instructor, the observer, the pilot trainee, the CPG trainee, the computer room, and the other instructor station. Additionally, the instructor can select and comnunicate with the trainees via the simulated VHF, UHF, and ICS systems. The control system includes a series of switchlights with identifying titles. The switchlights illuminate when in use, flash when being paged, and are off when not in use. Ten of the simulator communication switchlights (figure 7-1) are on the pilot and CPG COMM panel of the IOS console control panel. The switchlight used to communicate with the computer room is on the right side of the forward control panel. Rules and guidelines in the following paragraphs apply to the use of the CMS communications systems.

a. Instructor Private Communications (PILOT/CPG INSTR PVT, OBV PVT). The following criteria apply:

(1) Instructors can call and communicate with the other instructor or with their own observer.

(2) Either observer can call and communicate with either instructor.

(3) When a call is initiated by a keypress, the caller switchlight and the called party switchlight identifying the caller both flash.

(4) The flashing light is terminated by:

(a) The caller pressing the same switchlight.

(b) The caller selecting another interlocked switchlight.

(c) The called party answering the call by pressing the flashing switchlight.

(5) When the called party answers the call by pressing the flashing switchlight, both the caller switchlight and the called party switchlight are lit steadily, and a communications path between them is established. Actuation of push-to-talk switches on the headset cord is required to enable the audio gates.

(6) The lights are extinguished and communications terminated by:

(a) The caller pressing the same switchlight.

(b) The caller selecting another interlocked switchlight.

(c) The called party deselecting the call by pressing the caller switchlight.

(d) The called party initiating another call on an interlocked switchlight.

(7) The instructor (PILOT INST PVT or CPG INST PVT) PRIVATE COMM is functional in integrated and independent mode.

b. Trainee Private Communications (PILOT PVT, CPG PVT). The following criteria apply:

(1) Either instructor can selectively communicate with either trainee.

(2) Private communications to trainees is operational in integrated and independent mode.

(3) The trainee PRIVATE COMM (PILOT PVT or CPG PVT) is an override function. The instructor can communicate with the trainee regardless of trainee communications configuration.

(4) The instructor selects the desired trainee private communications switchlight. The pertinent switchlight is then lit steadily, and a private communications path to the trainee is enabled. Hot-mic operation is used.

(5) The instructor deselects trainee private communications by:

(a) Pressing the same switchlight.

(b) Selecting another interlocked switchlight.

c. Trainee Monitor (MON PILOT, MON CPG). The following criteria apply:

(1) In integrated mode, either instructor and either observer can monitor pilot or CPG communications.

(2) In independent mode:

(a) Both the pilot instructor and the pilot observer can monitor pilot communications.

(b) Both the CPG instructor and CPG observer can monitor CPG communications.

(3) An instructor or observer initiates the monitor function by pressing the associated switchlight on the IOS COMM control panel. The selected switchlight is lit steadily, and the pertinent trainee headset audio is gated to the monitor input in the instructor or observer audio system.

(4) The light is extinguished and the audio monitor terminated when the instructor or observer presses the monitor switchlight that is lit.

d. Radio Communications (PILOT VHF, CPG VHF, UHF). The following criteria apply:

(1) In integrated mode:

(a) Either instructor can communicate with either trainee over one of the two ARC-186 (VHF) or over the ARC-164 (UHF), provided the sets are operational. A radio set is operational if the set and either ICS COMM box are powered up.

(b) The instructor initiates a call to a trainee by depressing the XMIT (VHF, UHF) switchlight associated with the desired communications set.

(c) If the set is operational, the switchlight is lit, and the instructor mic audio is gated to the proper simulated radio receiver. Actuation of the instructor push-to-talk transmit switch is required.

(d) A trainee initiates a call on the desired set by configuring the cockpit set and COMM box properly and keying the press-to-talk switch.

(e) If the set is operational, the associated switchlight on both IOS COMM panels flash. Trainee-to-instructor call audio is always enabled.

(f) The flashing light is terminated by:

1 The trainee releasing the press-to-talk switch.

2 Either instructor pressing the flashing XMIT (PILOT VHF or CPG VHF, PILOT UHF or CPG UHF) switchlight.

(g) The instructor who pressed the flashing XMIT switchlight sees the light become steady, and mic audio is gated to the proper simulated radio receiver.

(h) Subsequent press-to-talk actuations by the trainee while transmitting on that particular radio set do not cause flashing of the XMIT switchlight of that set at either IOS COMM panel.

(i) After one instructor has elected to answer the call, the other IOS XMIT switchlight neither flashes nor lights. Audio over the particular radio set is not enabled for the inactive instructor.

(j) The second instructor can get in the loop by selecting the same radio set XMIT switchlight on the COMM panel.

(k) If both instructors are in the loop, one can disengage from the loop without deselecting the whole loop.

(1) At the disengaged IOS, the light is extinguished, and audio for that radio set is disabled.

(m) Radio communication is terminated by the last instructor in the loop by:

1 Pressing the radio set XMIT switchlight.

2 Selecting another interlocked switchlight.

(2) In independent mode:

(a) The pilot instructor can communicate with the pilot trainee over the pilot ARC-186 (VHF) or ARC-164 (UHF) if the sets are operational, and over the CPG ARC-186 (VHF) regardless of its operational status.

(b) The CPG instructor can communicate with the CPG trainee over the CPG ARC-186 (VHF) if the set is operational, and over the pilot ARC-186 (VHF) and ARC-164 (UHF) regardless of their operational status.

(c) The instructor initiates a call to a trainee by depressing the XMIT switchlight associated with the desired communications set. Actuating the transmit switch completes the transmission loop.

(d) The switchlight is lit, and the instructor mic audio is gated to the proper simulated radio receiver:

1 If the selected radio set is operational where it is required to be operational.

2 If the selected radio set is to be used regardless of operational status.

(e) A trainee initiates a call on the desired set by configuring the cockpit set and COMM box properly and keying the press-to-talk switch.

(f) When the operational requirements for the set are met, the associated switchlight on the respective IOS COMM panel flashes. Trainee-to-instructor call audio is always enabled.

(g) The flashing light is terminated by:

1 The trainee releasing the press-to-talk switch.

2 The instructor pressing the flashing XMIT switchlight.

(h) When the instructor presses the flashing XMIT switchlight, it becomes steadily lit, and mic audio is gated to the proper simulated radio receiver.

(i) Subsequent press-to-talk actuations by the trainee on that particular radio set do not flash the switchlight while it is selected.

(j) Radio communication is terminated when the instructor:

1 Presses the radio set XMIT switchlight.

2 Selects another interlocked switchlight.

e. Intercommunications System (ICS) Communications. The following criteria apply:

(1) In integrated mode:

(a) Instructors, observers, and trainees can all communicate via the intercommunication system (ICS), provided the sets are operational. Trainee sets are powered separately.

(b) Instructors and observers enter the system by pressing the ICS switchlights.

(c) When either ICS set is operational, the selected switchlight is lit, and caller mic audio is gated to the simulated ICS whenever the transmit switch is actuated.

(d) When a trainee transmits on an operational ICS set, the ICS switchlight on both instructor and both observer COMM panels flash. Trainee-to-instructor call audio is always enabled.

(e) The flashing light is terminated by:

1 The trainee releasing the press-to-talk switch.

2 An instructor or an observer pressing the flashing ICS switchlight.

(f) The instructor or observer who pressed the flashing ICS switchlight sees the light become steady, and mic audio is gated to the simulated ICS.

(g) Subsequent press-to-talk actuations by the trainee while transmitting on the ICS do not cause flashing of the ICS switchlight on any IOS or observer COMM panel.

(h) After a call has been answered, the ICS switchlights at the other COMM panels neither flash nor light. ICS audio is enabled only for the instructor or observer who has selected ICS.

(i) Any instructor or observer can enter the loop by pressing the ICS switchlight.

(j) If more than one instructor or observer are in the loop, any one can disengage from the loop without deselecting the whole loop.

(k) When ICS is deselected, the light is extinguished and ICS audio is disabled.

(1) ICS communication is terminated by the last instructor or observer in the loop by:

1 Pressing the ICS switchlight.

2 Selecting another interlocked switchlight.

(2) In independent mode:

(a) The pilot instructor, pilot observer, and pilot trainee can communicate on the ICS, provided the pilot ICS is operational.

(b) The CPG instructor, CPG observer, and CPG trainee can communicate on the ICS, provided the CPG ICS is operational.

(c) The effects of instructor, observer, or trainee switchlight selections and transmissions are as in integrated mode, except that such effects are confined to each cockpit.

f. Computer Room Communications. The following criteria apply:

(1) The instructors can each communicate with computer area personnel, and vice versa.

(2) The COMP ROOM CALL switchlight on the IOS forward control panel (figure 7-4) is not interlocked with the other switchlights on the IOS console control panel. This allows instructor communications to the computer area even while in communication with a trainee or another instructor.

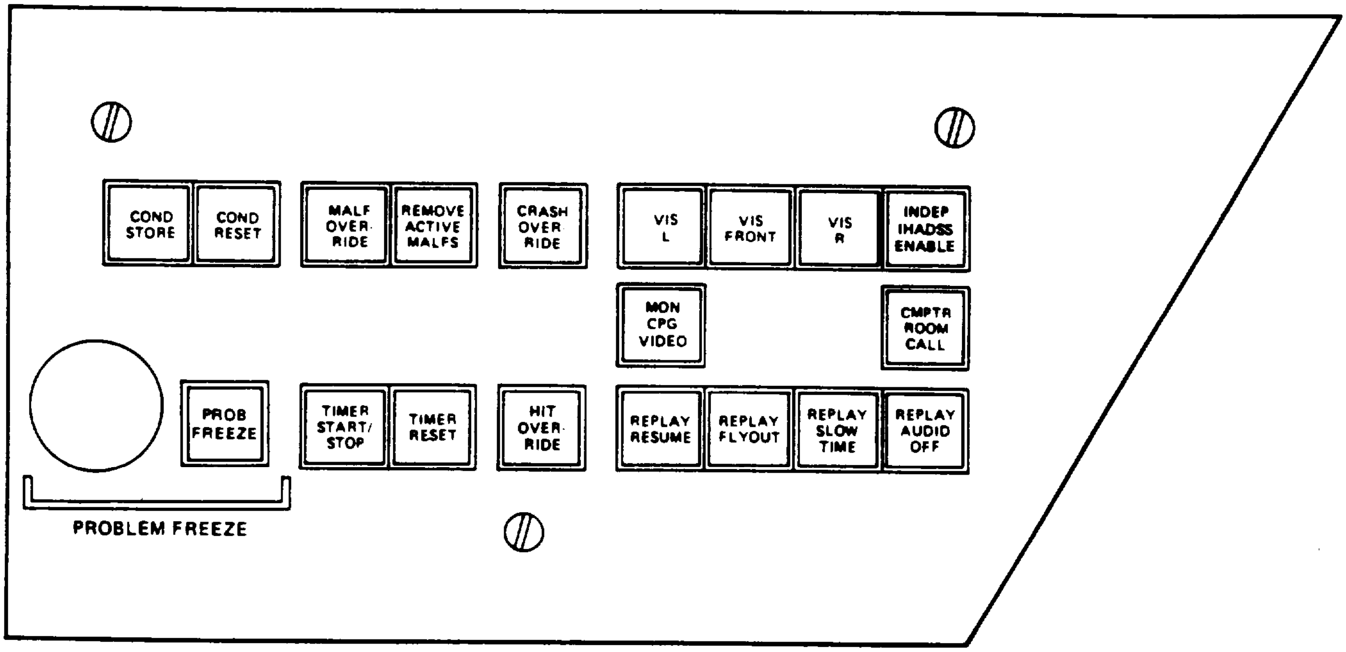
(3) When an instructor presses the COMP ROOM CALL switchlight, the switchlights on the IOS COMM panel and on the computer room audio control panel flash and a chime sounds in the computer area.

(4) Computer room personnel can call either instructor by pressing the correspondingly identified switchlight on the computer roan audio control panel.

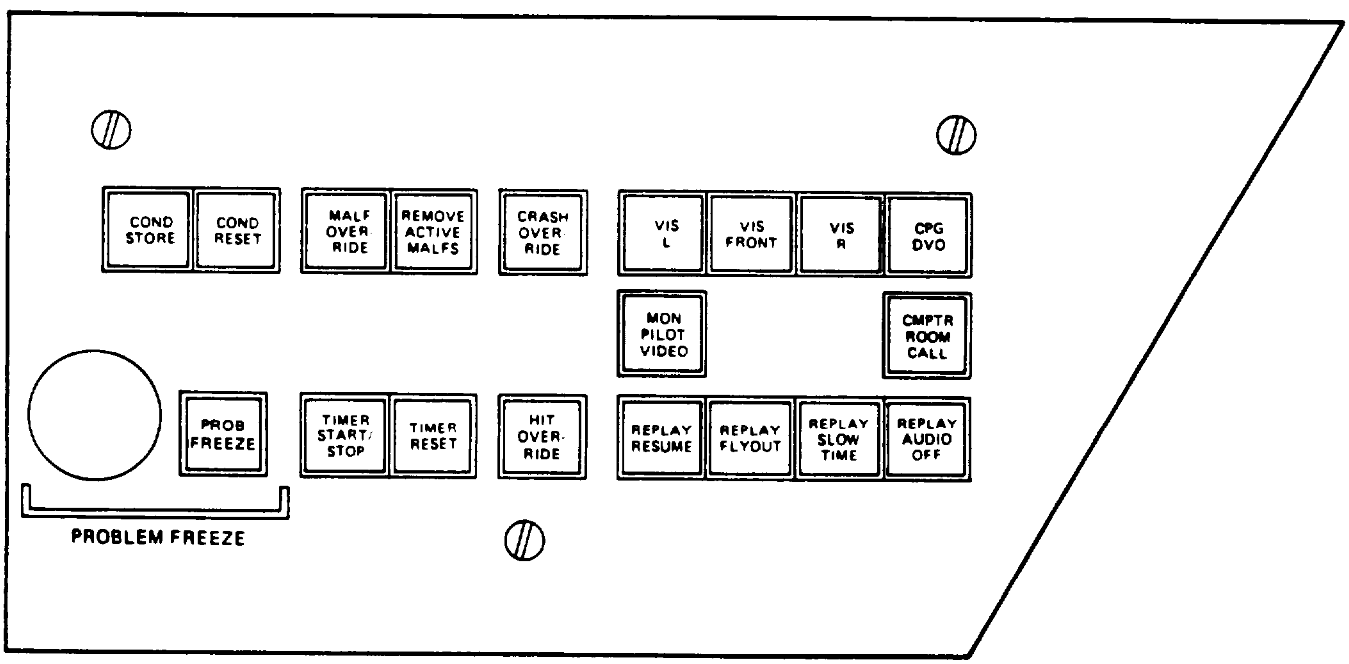
(5) When this happens, the COMP ROOM CALL switchlight at the COMM panel of the desired instructor, as well as the switchlight on the computer room audio control panel, flashes.

(6) The flashing lights are extinguished if the caller presses the switchlight again.

(7) The flashing lights become steadily lit when the called party answers by depressing the flashing switchlight. A communications path between them is then established.



PILOT INSTRUCTOR FORWARD CONTROL PANEL



CPG INSTRUCTOR FORWARD CONTROL PANEL

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Figure 7-4. Pilot/CPG IOS Forward Control Panels

(8) Lights are extinguished at both panels at the termination of a call; that is, when either the caller or the called party presses the switchlight. Communications are then disabled.

7-7. HARDCOPY. A hardcopy unit at each IOS can be accessed through a HARDCOPY switchlight on the pilot and CPG console control panels (figure 7-1). The unit accepts up to five requests for copy in rapid succession. The hardcopy unit is used to provide a copy of perishable information displayed on the selected CRT; to aid the instructor in subsequent review of trainee performance; and to provide objective information for permanent records. Use of the hardcopy feature does not affect any aspect of the simulation except for the generation of the copy. This feature can be used independently of other instructional activities in progress.

7-8. LEFT CRT/RIGHT CRT. These switchlights allow the keyboard to be assigned to the left or right CRT respectively for page control, data entry, and hard copy.

7-8.1 STATUS INTERCHANGE. Status interchange allows for the selectable switching of the status pages between the two CRTs.

7-8.2 CRT INTERCHANGE. CRT interchange allows for the selectable switching of the main page area and index and control page areas together between the two CRTs.

7-9. INDICATOR LAMP TEST. There is one indicator lamp test switchlight on the console control panel (figure 7-1) at each IOS. When depressed at either IOS, this switchlight causes the illumination of all lamps on the console control panel and forward control panel at the respective IOS.

7-10. MASTER RESET. A master reset switchlight is located in the miscellaneous section of the console control panel (figure 7-1) at each IOS. The master reset, when depressed, deletes all temporary modifications to the simulation (e.g., all TEE's. AMI's, and IC's).

7-11. CPG AUTOFLY CONTROL. These controls are used to manually control heading and altitude of the CPG trainer during target engagement activities and weapons firing in the autofly mode of operation.

a. The MANUAL switchlight on the console control panel allows the instructor to have manual control at hover points, to allow the CPG trainee more time to complete firing activities. Control of heading and altitude is accomplished by the use of a 4-direction joystick. Heading is accomplished by left or right movement, and altitude is changed by moving the joystick forward for up and backward for down.

b. Manual control can be activated any time prior to arrival, or while at a preselected hover location. This feature can be used to extend the period that the aircraft is unmasked beyond that which was originally recorded.

c. These controls are on the right side of the console control panel (figure 7-l) at the CPG IOS only.

7-12. LIGHTING CONTROL. This control varies intensity of switchlights on both control panels.

7-13. HEADSET VOLUME CONTROL. The headset volme control is a multiposition potentiometer located on each console control panel (figure 7-1). When this potentiometer is turned fully counterclockwise it allows minimum volume to the respective headset, and when turned fully clockwise it allows maximum volume to the respective headset.

7-14. STORE/RESET CURRENT CONDITIOUS. The store/reset (S/R) current conditions feature permits the CMS to be returned rapidly to a previously encountered set of simulated conditions. When activated, the store function places the current flight conditions into memory (temporary memory) for subsequent recall or reset. Only one set of conditions can be stored at any one time with this feature. The reset function returns (resets) the CMS to the flight conditions that existed at the time the store function was activated.

a. Controls for the S/R feature are on the forward control panel (figure 7-4) at each IOS and on the trainee control panel (figure 7-2) on the left side of each trainee cockpit. The store function can be used any time in or out of freeze. The reset function, however, can be accessed only while the CMS is In freeze.

b. Instructors can use the store reset current conditions function to enable rapid and easy reestablishment of the exact condition needed for a particular instructional activity, and to provide access to a modified IC set without having to repeat the modification process.

c. If no current conditions have been stored during a training period, activation of the reset function returns the CMS to the most recently selected IC set. Selection of a new IC set automatically replaces any stored conditions.

d. If desired or required, a set of stored conditions can be either displayed, hardcopied, or saved as a temporary IC set. The following procedures will permit the instructor to:

(1) Display:

(a) Place the simulator in problem freeze.

(b) Activate RESET.

(c) When flashing FREEZE light ceases, call up and display CC page 150.

(2) Hardcopy:

(a) Display CC page 150 on IOS CRT.

(b) Depress HARDCOPY switchlight on console control panel.

(3) Save as an IC set:

(a) After RESET is activated and flashing FREEZE ceases, call up and display any IC set.

(b) Use command lines 53 and 54 to save the set of conditions as a temporary IC set at that IC set number. This temporary IC set is retained until a master reset is activated.

7-15. MALFUNCTION CONTROLS. There are two switchlight keys on the forward control panel (figure 7-4) associated with malfunction control, MALF OVERRIDE and REMOVE ACTIVE MALFS.

a. MALF OVERRIDE can be used to delete an impending AMI during the 10-second alert period before it is actually activated. This AMI is disabled for the duration of the training period and does not affect the remaining malfunctions in that AMI set. However, the overridden AMI can be manually inserted via the manual malfunction pages and the data entry keyboard.

b. REMOVE ACTIVE MALFS can be used to delete all active malfunctions, either manual or automatic, from the simulation.

7-16. CRASH/HIT OVERRIDE. The CRASH/HIT OVERRIDE feature freezes or suspends on-going simulated activity when predetermined conditions are met. The effects upon the simulation and upon the cockpit and IOS controls of an automatically initiated freeze are identical to those of a manually initiated freeze. The purpose of the automatic freeze (AF) feature is to place the simulator in freeze immediately upon the occurrence of specified events, and to do so without intervention by the instructor, observer, or trainee.

a. Three kinds of events can trigger an automatic freeze:

(1) Entering a set of flight conditions that would be the equivalent of a crash (e.g., exceeding aircraft structural limits or impacting the surface at an excessive rate).

(2) Being impacted by sufficient hits from threat weapons (and the malfunctions associated with such hits) that crash conditions result.

(3) Encountering conditions that mandate placing the simulator In freeze (e.g., preparing the simulator for an initial instructional activity or reaching the end of a period of recorded flight, i.e., DEMOS, AUTOFLY, PLAYBACK).

b. Since the initiation of a freeze condition resulting from such events may not be expected, its onset is called to the attention of the instructor via a flashing PROB FREEZE switchlight, symbology on MAP pages, and an alert message appearing in the CRT alert block.

c. The simulator can be released from freeze by insertion of a new IC set or depressing HIT OVERRIDE. However, in the case of an automatically initiated freeze resulting from the entry of the simulated aircraft into crash conditions, action must be taken to remove or overcome those conditions before the period of freeze can be ended. This can be done while the simulator is in freeze by selecting and inserting a new set of initial conditions preparatory to beginning a new training activity, thus effectively removing the aircraft from the conditions that led to the freeze. Alternatively, the instructor can elect to override the crash conditions and permit the flight to continue from the point of crash. When this alternative is selected, the simulated aircraft flies out of the crash conditions following termination of freeze.

d. In addition to standard crash conditions, automatic initiation of freeze occurs when the simulator threat-scoring algorithm determines that the simulated aircraft has received a sufficient number of rounds from an enemy weapon that aircraft systems are degraded to the point where an emergency landing is required and that landing is unsuccessful. When this occurs, the simulator enters the freeze state automatically and remains in that state until it is ended by removing the malfunctions. The instructor can also elect in advance to override the malfunctions associated with the threat algorithm in order to avoid frequent forced landings for an unskilled pilot. This is accomplished by engaging HIT OVERRIDE. When HIT OVERRIDE is engaged, the effects of being hit, except aircraft degradation, occur (e.g., sounds and weapons signatures). Scoring and status information is displayed at the IOS. However, the aircraft continues to be flyable. The instructor can elect to override or not override hit or crash conditions.

e. Other events that automatically initiate freeze relate to administrative aspects of the simulator instructional process and provide an interruption in the simulation at points at which a decision must be made concerning the next instructional activity. No automatic freeze override function is appropriate with respect to these events, because their occurrence indicates a choice point at which a different activity must be initiated if the simulation is to continue. Such an event occurs when the simulator is initially made ready for use at the beginning of a period of instruction and at the end of a segment of recorded flight (e.g., upon completion of a demonstration or a selected interval of record/playback).

f. Controls for CRASH OVERRIDE and HIT OVERRIDE are alternate-action switchlights on the IOS forward control panels (figure 7-4). These switchlights are used to prevent crash conditions, override a crash condition, and prevent aircraft systems degradation due to hits.

7-17. INSTRUCTOR VISUAL CONTROL. All controls for monitoring of the visual systems are on the right side of the forward control panel (figure 7-4). These switchlights allow the instructors to monitor different types of displays depending on the mode of operation.

a. VIS L, VIS FRONT, and VIS R Switchlights. These switchlights allow the instructor to select the desired OTW display to be viewed on the overhead DVO/OTW monitor.

b. Unique CPG IOS Switchlights. The following switchlights are at the CPG IOS only:

(1) MON PILOT VIDEO (active in the integrated mode only) allows the CPG instructor to view the current sensor system field of view being used by the pilot on map displays.

(2) CPG DVO allows the CPG instructor to monitor the CPG DVO display when it is being employed.

c. Unique Pilot IOS Switchlights. The following switchlights are at the pilot IOS only:

(1) MON CPG VIDEO (active in the integrated mode only) allows the pilot instructor to view the current sensor field of view system being used by the CPG on nap displays.

(2) INDEP IHADSS ENABLE allows the pilot instructor to activate, but not monitor, the IHADSS in the independent mode only. This switchlight does not operate in the integrated mode of operation.

7-18. MANUAL FREEZE. Manual freeze (MF) enables the instructor or the trainee to freeze or suspend ongoing simulated activity. During the period of suspension, the simulated conditions existing at the onset of MF are preserved, and the suspended activity can be resumed at the option of the instructor or the trainee. Except for the primary flight controls, controls and displays at the IOS and in the cockpit retain their normal function during use of this feature and can be used to change the preserved conditions. During a period of freeze, cockpit avionics displays reflect the fixed position of the simulated aircraft, but otherwise function normally in response to operation of the controls associated with such displays.

a. The primary purpose of the MF feature is to permit interruption of the simulation so that other instructional or supporting activities can take place or to provide a break in the instruction. The secondary purpose of this feature is to provide a stable condition during periods in which the CMS is on but the cockpit can be unoccupied; thus allowing necessary setup or simulation modification functions to be performed through controls at the IOS. Cockpit ingress/egress also is possible during periods of freeze without concern for inadvertent movement of cockpit controls.

b. Controls for manual freeze are on the forward control panel (figure 7-4) of each IOS and on the trainee control panel (figure 7-2) of each cockpit. In the integrated mode of operation, activation of the freeze control in either cockpit suspends activities in both cockpits. In independent mode of operation, activation of the freeze control in one cockpit has no effect on the other cockpit.

c. The manual freeze function is used to:

Temporarily interrupt an ongoing training activity to critique performance
Reposition the CMS for another instructional activity
Preserve Perishable CRT data while hardcopy is being used
Effect changes in the simulation
Access other instructional features

d. A modification to the simulation that involves a discontinuity in any parameter affecting flight can be made only while the simulator is in a freeze state (e.g., repositioning of the simulated aircraft or substituting one external visual display scene for another). Discontinuities involving visual displays require that such displays be blanked to minimize distractions to the pilot. Instructional features that are incompatible with simulated flight under pilot control can be initiated only when the simulator is in a freeze state (e.g., record/playback and demonstration). Likewise, use of the hardcopy feature when simultaneous copies of multiple displays are desired, can occur only when the simulator is in freeze. Use of other features, such as malfunction simulation, automatic malfunction insertion, and parameter freeze, can be initiated without respect to the freeze status of the simulator, but the effect of these features upon the simulation is noted only when the simulation resumes.

7-19. ELAPSED-TIME CLOCK (TIMER). The elapsed-tire clock is a digital display that, when activated, displays real-time in minutes and seconds. A discrete timer and controls are provided for each instructor. The timer can be operated independently at each IOS except during periods of the blinking PROBLEM FREEZE switchlight (i.e., except during periods of reset or changing simulator conditions).

a. The timer digital display is located in the upper left-hand corner of the main page area on one of the IOS CRTs. It is permanently displayed during training and remains so even during page changes. Zero minutes and zero seconds (00:00) are displayed until the timer is activated. Controls to operate the timer are on the forward control panel (figure 7-4). A discrete switchlight is used to start and stop the timer action. When activated (TIMER START/STOP depressed), the display counts real-time in seconds and minutes. When depressed again (TIMER START/STOP), the display maintains the last digits in a freeze state. When depressed again, it activates the display, and displayed time is cumulative. Additionally, A TIMER RESET switch, when depressed, resets the minutes and seconds to zero.

b. The instructors use the timers to determine elapsed problem time, to relate errors to problem time, and to relate training events/activities to problem time.

7-20. REPLAY CONTROL. Four switchlights associated with the playback mode of operation are located in the lower right corner of the forward control panel (figure 7-4). The switchlights operate as follows:

a. REPLAY RESUME allows the instructor to freeze the playback at any point and select RESUME. When selected, the simulator resets to the starting point of playback activation and permits training to continue from that point. When initiated. the REPLAY RESUME switchlight illuminates, and the PROBLEM FREEZE switchlight flashes until initialization is complete and reset discrepancies have been cleared.

b. REPLAY FLYOUT allows the instructor to freeze the playback at any Point and select FLYOUT. When selected, training can continue from that point in the playback operation.

c. REPLAY SLOW TIME allows the instructor to slow the playback down, to allow more time for the trainee to grasp important relationships between control inputs and resulting instrument indications, aircraft attitude, and system performance. slow-time playback takes twice as long to occur as real-time playback. There is no audio communications replay during slow-time playback.

d. REPLAY AUDIO OFF allows the instructor to turn audio on or off any time during real-time playback.

7-21. INSTRUCTORS MONITORS. The instructor video monitor is a color CRT that permits instructors to monitor selectively any of the three out-the-window (OTW) visual displays or the CPG direct view optics (DVO) display. The only time a video signal is available to monitor with this CRT is when the CMS is being operated in integrated mode with visual mode 2 (OTW & DVO), in pilot independent lode with visual mode 5, or CPG independent mode with visual mode 4. (Refer to table 7-2).

a. The instructor video monitor is above the data graphic display CRT at the IDS. (See figure 2-2). There is a power ON/OFF switch on the monitor. Controls to select the visual display to be monitored are on the forward control panel. The pilot instructor has three switchlights, VIS L, VIS FRONT, and VIS R, (figure 7-4) for selection of the left, front, or right visual display. The CPG instructor has four witchlights, VIS L, VIS FRONT, VIS R, and CPG DVO (figure 7-4). for selection of the left, front, right, or DVO visual display.

b. The instructor can use the video monitor to selectively monitor either the pilot or CPG OTW field-of-view and to monitor DVO when the CPG trainee is employing that system.

Table 7-2. Visual Monitor Display Modes

CMS visual mode	Pilot OTW	Pilot IHADSS symbo1	Pilot IHADSS PNVS symbol	Pilot VDU	CPG OTW	CPG IHADS symbol	CPG IHADSS TADS symbol	CPG ORT HOD HDD
Integrated								
1			X[a]	X[a]			X[a]	X[a]
2	X	X[a]		X[a]	X[b]	X[c]	X[c]	X
3			X[a]	X[a]			X[a]	X[a]
Independent								
4			X	X	X	X		
5	X[d]	X[d] or	X[d]	X[d]			X[e]	X

[a]Includes operational monitoring capability (when pilot selects CPG monitor while CPG has DVO selected, a monochrome version of the DVO scene is provided on pilot IHADSS).

[b]Dup1icate imagery of pilot OTW.

[c]CPG views IHADSS symbology with or without TADS video.

[d]Either OTW and symbology or PNVS and VDU.

[e]Either TADS or PNVS.

c. The TADS/PNVS monitor features include two black-and-white CRTs. Use of two CRTs permit the instructor to monitor the FLIR sensor imagery (IHADSS, TADS/PNVS) and symbology being viewed by both pilot or CPG. The visual system permits the pilot/CPG to view one sensor display at a time; the instructor monitors are repeaters of both pilot and CPG displays.

d. The TADS/PNVS monitors are above the IOS CRT (figure 2-2). The TADS/PNVS pointing information is displayed on CRT page 160. This page provides information related to the direction the TADS, PNVS or IHADSS being monitored is pointing; that is, the line-of-sight of the trainee using the sensor. The display indicates line-of-sight in degrees left or right of center, indicating the up or down view angle, and which field-of-view is being used: Z = zoom, N = narrow, W = wide, and M = medium.

e. Instructors can use their displays to monitor/observe the pilot trainee PNVS FLIR scene, to monitor/observe the CPG trainee TADS FLIR scene, to obtain data from the symbology displayed on the pilot/CPG TADS/PNVS displays, and to provide mission assistance to trainee during independent mode training.

7-22. TRAINEE CONTROL PANEL. These panels provide the trainees with limited control of simulator functions. The panel is located on the left canopy rail (figure 7-2) in each cockpit and contains six switches. These switches are identical to, and perform the same functions as, the respective switches on the IOS consoles.

7-23. OBSERVER COMMUNICATIONS PANEL. The observer communications panel is on the rear wall adjacent to the observer station (figure 7-5). Included on the panel are an OBS HDST VOL knob to control the observer headset volume, and five communication switchlights that are explained in paragraph 7-6. A separate headset jack, with an audio preamplifier, is mounted in the ceiling above and behind the observer's chair. The observer COMM panel and headset allows the observer to communicate with the trainee and the instructor at all times.

7-24. IOS CRT SCREEN DISPLAY. The instructor data graphics CRT display is composed of five areas that provide various types of information necessary for monitoring and controlling the simulation.

a. Main Page Area (Figure 7-6). This constitutes the largest portion of the CRT page and is used to display pages of alphanumeric and graphic information. Pages are displayed in logical groupings containing common subject matter and are addressed via the data entry keyboard. These logical groupings make up a general index. each having its own detailed mini index that lists the contents of that group. All directly addressable CRT pages have a unique 3-digit identifier or page number. (Table 7-3 lists the groups and their respective page numbers.)

(1) CRT pages fall into two categories: editable, or modifiable; and noneditable, or fixed. The editable/modifiable pages contain listings that may be used as sets in their entirety and/or listings for which specific selections or modifications may be made. A page categorized as editable/modifiable has a reference line number for each of the items on that page that can be changed by the instructor. Examples of such pages are:

Initial condition (IC) sets (pages 101 - 145)
Current conditions (CC) (pages 150 - 151)
parameter freeze (page 160)
Playback control (page 470)

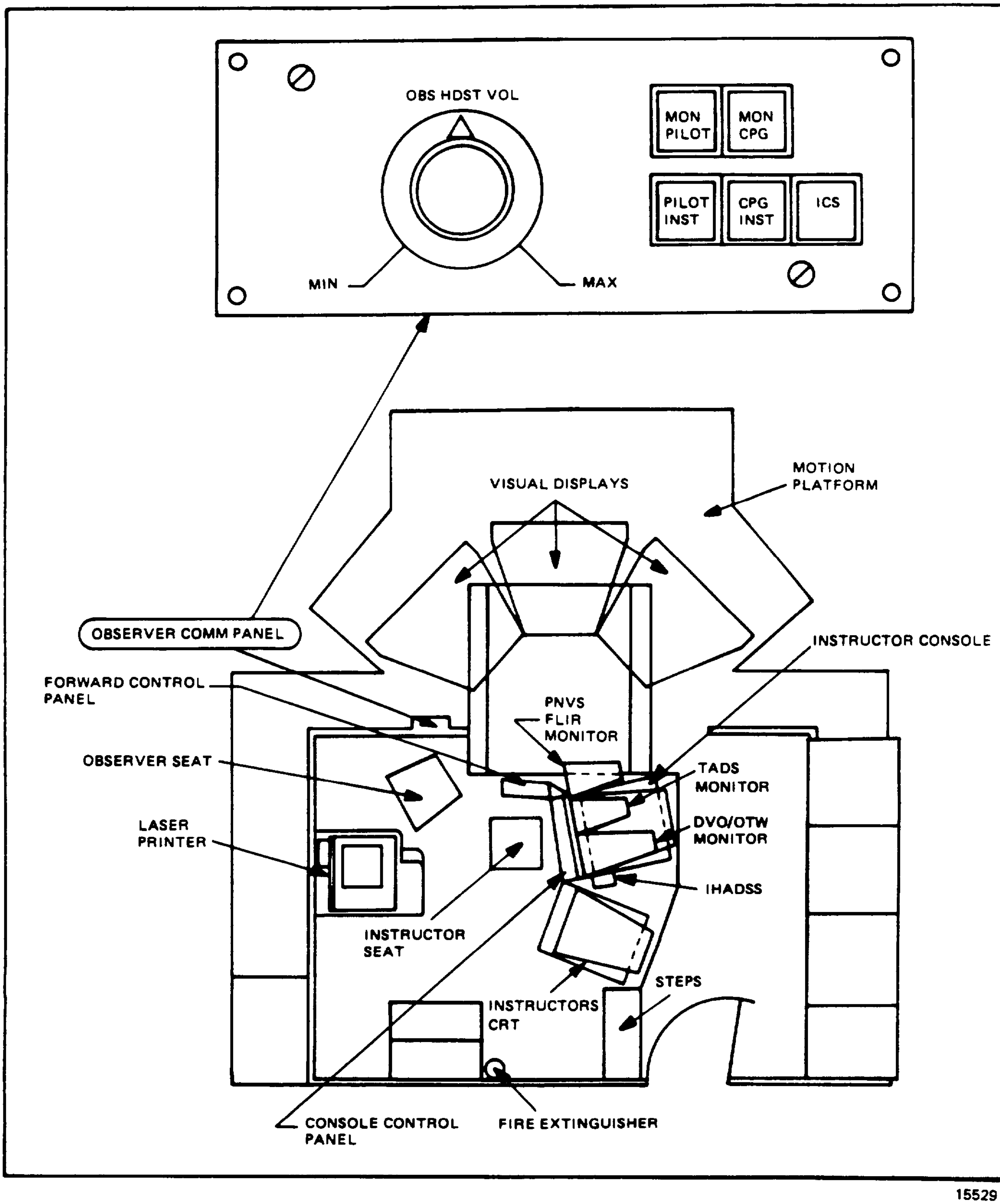

Figure 7-5. Observer Communications Panel

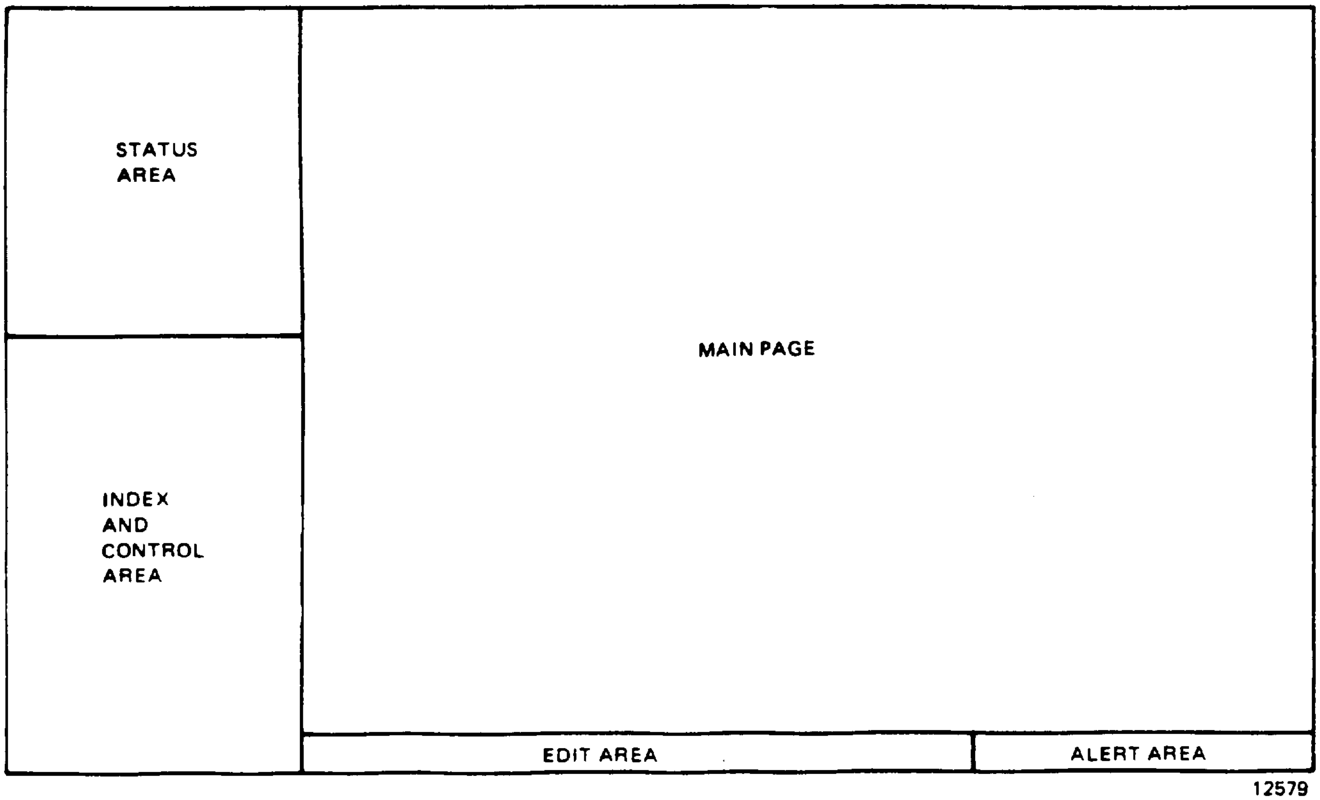

Figure 7-6. IOS CRT Screen Display

Table 7-3. General CRT Page Grouping

Display group	subject	Page
0	General Index	
1	Initial/current conditions	100
2	Malfunctions	200
3	Graphics	300
4	Demonstrations/autofly/record playback	400
5	Targets	500
6	Navigation/communication	600
7	700 series Index	700
8	800 series index	800
9	Preparation and test	900

Target control (page 580)
Visionics pointing/remote designator (page 581)
Target evaluation (page 583)
FARP control (page 592)
Malfunctions (pages 221 - 233)
Missing/independent mode (page 175)

(2) The noneditable/fixed pages contain listings and graphics that are used as is and cannot be changed by the instructor. The instructor can make selections from sane of these listings, but cannot otherwise modify the content of the programs listed. Many of these listings and graphics pages are used primarily to provide feedback or other information to the instructor. Listings from which selections can be made include:

AMI sets (pages 201-215)
Demonstrations (pages 401-420)
Autofly sets (pages 421-460)
Target engagement exercises (pages 501-520)
Target type list (page 531)
Target site list (pages 532-535)
Weapons loading/rocket configuration (pages 590 and 591)
Indexes (pages 100,200,......900)

(3) Listings and/or graphics pages that provide feedback or other information include:

Cockpit discrepancies (page 170)
Target status (page 530)
Target sites overview (page 540)
Battle position (pages 301-334, 541-574)
Map symbology (page 342)
Cross-country (X-C) (pages 340, 343)
Engagement performance (pages 595-596)
Threat weapons scoring (page 594)
GCA (pages 350-351)
Flight monitor (page 180)
Ownship weapon scoring (page 597)
Remote designation (page 582)
Threat scoring graphics (page 593)

(4) The first page of each group is the index page for that group (e.g., 100, 200, up to and including 900). The first digit of each page number identifies the grouping, and the second and third digits identify the page address within the group (e.g., the current conditions page (CC) is CRT page 150, the target control page is CRT page 580). In these examples, for CRT page 150 the 1 identifies the IC/CC (initial/current conditions) grouping, and 50 is the address of CURRENT CONDITIONS within that group. For CRT page 580, the 5 identifies the TARGET grouping, and 80 is the address of TARGET CONTROL within that group.

(5) On pages containing data where selections can be made or the value of a parameter changed, there is a 2-digit line reference number for each selection or parameter. Thus, each datum has a unique 5-digit address consisting of its page number (the first three digits) and its line number (the last two digits). Examples of the 5-digit address are shown below. In the first example, the line number 03 illustrates the selection of an item within a set, whereas the second

example illustrates the line number of a parameter (airspeed) that may be changed if the instructor so desires.

Example 1: Number 22303

2	MALFUNCTION group
23	ENGINE SYSTEMS MALFUNCTIONS (Malfunction type #23)
03	#1 HOT START (Line #03 within engine malfunctions)

Example 2: Number 10103

1	IC/CC group
01	IC SET NUMBER 1 (Initial conditions set #01)
03	AIRSPEED line reference number (Line #03 within IC set #1)

b. Status Area. The upper left-hand corner of the CRT display contains a status area. The status area displays a variety of information including mission elapsed time, mode of CMS operation, aircraft flight data, rotor and engine data, active malfunctions, weapons status, and communications channels in use. The information is updated continuously and allows the instructor to monitor key elements of the training situation at a glance without changing CRT pages. (Figure 7-7 shows an example of the status area as shown on the CRT, and table 7-4 Identifies each data item shown) As can be seen in figure 7-7, there are five subdivisions to the status area. The top area includes mission elapsed time (MET), CMS mode, visual mode, and features in use. The second area depicts aircraft flight, rotor, and engine data: the third area, active manual malfunctions; the fourth area, weapons status: and the fifth area includes communications frequencies, trainee (student) identification, and threat event numbers. A second status area display includes the Alpha Numeric Display and the number of chaff remaining.

c. Index and Control Area. The lower left-hand corner of the CRT display is an index and control area. Each major grouping of CRT pages has a mini-index (figure 7-8) that is usually displayed in the index and control area whenever any page from the parent group is displayed in the main page area. The mini-index provides a ready reference to other items within the group during normal training operations. On some occasions, the mini-index is replaced with a special reference list unique to the display in the main page area of the CRT. For example, whenever a GCA page is displayed, the index and control area contains reference numbers for keyboard inputs that initiate and terminate the GCA program at the airfield. In addition. certain graphic CRT pages have reference lists for erasing or recalling ground track traces and for advancing the field-of-fire on the battle position pages.

d. Edit Area. The last three rows of the CRT display are an edit area (figure 7-6). This area echos or repeats all of the instructor keystrokes, prior to entry. The edit area also displays operator error messages (e.g., keystroking a number beyond the established range of values for a given entry). Erroneous keystrokes can be deleted one item at a time via the backspace key, or the entire edit line can be deleted via the clear key.

e. Alert Area. The lower right-hand corner of the CRT display is for alert messages (figure 7-6). This area displays systems messages to the instructor. Examples of the type of messages that appear in the alert area are: IC IN PROGRESS - when an IC has been entered and is being set up, this message appears in the alert area: 22303 #1 HOT START - when an AMI set is in use and a malfunction is triggered, a message similar to this appears for 10 seconds prior to insertion/activation.

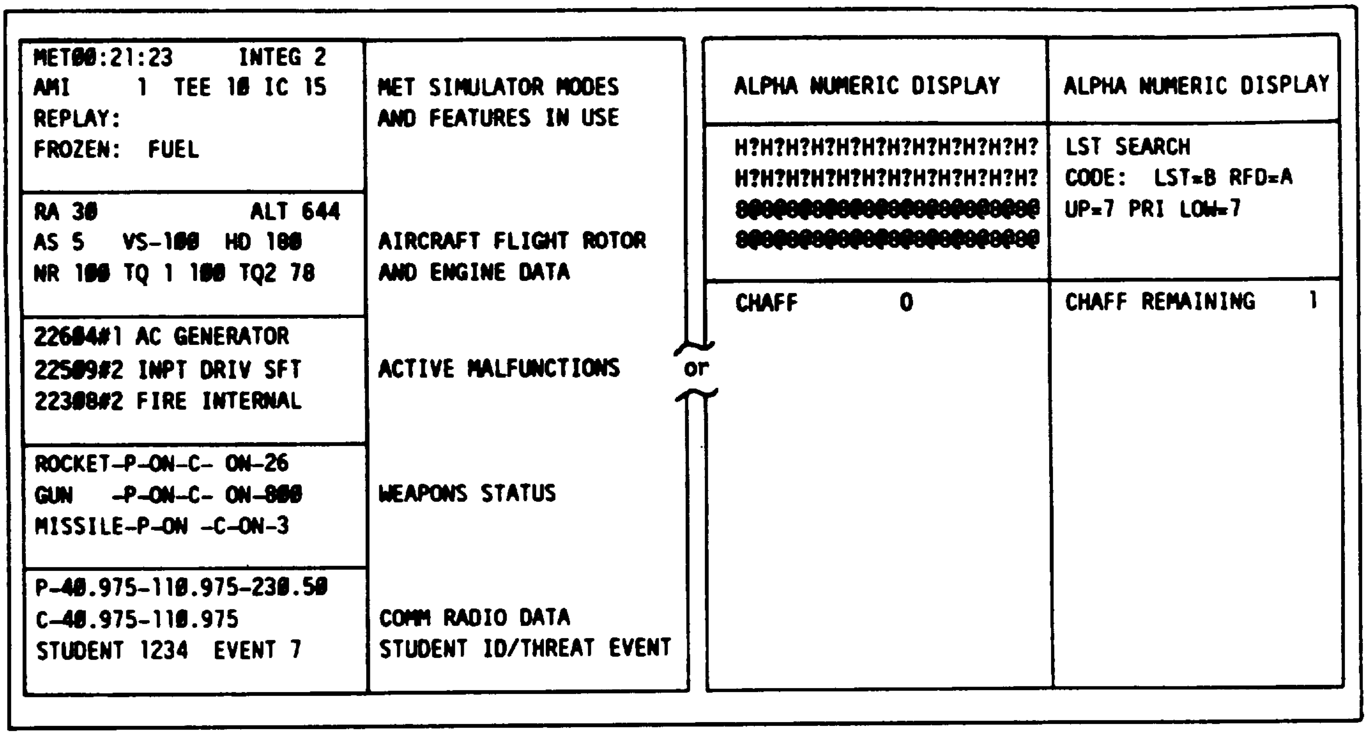

Figure 7-7. Typical CRT Page Status Areas

Table 7-4. IOS CRT Status Area Data

Item	Information
MET	Hours, minutes, and seconds of mission elapsed time. The clock starts with Initialization and restarts with new IC'S. The MET halts during freeze and resumes after freeze.
SIM MODE	Integrated (INTEG) or Independent (INDEP)
VIS MODE	1, 2, 3, 4, 5 (Refer to IC pages and table 7-2.)
AMI; TEE; IC	Displays the number of each set selected and entered into the simulation.
REPLAY	Indicates the demo, playback, or autofly program selected and time to completion of the program.
FROZEN	Indicates which parameters have been frozen, (up to eight parameters may be frozen, e.g., ALT, AS, HD).
	Indicates radar altitude up to 1500 feet AGL.
ALT	Indicates altitude in feet MSL.

Table 7-4. IOS CRT Status Area Data - Continued

Item	Information
AS	Indicates airspeed in knots TAS.
VS	Indicates vertical speed in feet per minute.
HDG	Indicates heading in degrees magnetic.
NR	Indicates rotor rpm as a percent of maximum.
TQ1	Indicates engine torque as a percent of maximum.
TQ2	Indicates engine torque as a percent of maximum.
MALFUNCTIONS	Indicates active malfunction number and title (up to six can be displayed).
ROCKET (GND/OFF/NORM) GUN (FXD/OFF/NORM) MISSILE (ON/OFF)	Indicates position of pilot(P)/CPG(C) fire control selector switch and total rounds remaining for each system.
COMM P	Indicates pilot VHF FM, VHF AM, and UHF radio frequency tuned on control head.
COMM C	Indicates CPG VHF FM and VHF AM radio frequency tuned on control head.
STUDENT	Student (trainee) identification number entered by instructor via the data entry keyboard.
EVENT	Indicates threat acquisition event number up to 99. Each time a threat acquires the ownship, a sequential number appears here (1-99). To save this event data, a hardcopy of CRT page 594 must be made before event 13. (Only the last 12 events are displayed.)
or	
ALPHA NUMERIC DISPLAY	Applicable alpha numeric display data repeated.
CHAFF REMAINING	Number of bundles of chaff remaining.

Section II. CRT PAGE DISPLAYS DESCRIPTIONS

7-25. MINI-INDEXES. The mini-indexes are displayed In the index and control area of each CRT page. The type of CRT page called up determines whether a mini-index (figure 7-8) is displayed. Any of the map pages, when displayed, have control information that is displayed In the index and control area instead of the mini indexes . Any mini-index can be displayed at any time regardless of the type of CRT page currently displayed. To display the available mini-indexes, key In 0 DISPL on the data entry keyboard. This calls up the general index. Select the desired mini-index from the general Index, and key in n (where n - 0 - 9).

NOTE

Display pages Illustrated in this manual reflect display format only. Conditions Indicated are typical and may not reflect a current operational condition.

0	INDEX	
DISP	SUBJECT	PAGE
1	INIT/CURR COND	100
2	MALFUNCTIONS	200
3	GRAPHICS	300
4	DEMOS/AF/RP	400
5	TARGETS	500
6	NAV/COMM	600
7	700 SERIES INDEX	700
8	800 SERIES INDEX	800
9	PREP & TEST	900

Figure 7-8. Mini-Indexes

7-26. INITIAL CONDITIONS. Initial condition (IC sets (figures 7-9 and 7-10) are preprogramed sets of operation configurations and geographical locations for the simulated aircraft. The computer memory is capable of storing up to 45 permanent IC sets. The setup points associated with automated training programs (demonstrations) can also be used as IC sets. In addition, the store/reset and record/playback features offer additional sources of initial conditions. Each IC set places the simulated aircraft in a specific geographical location and configuration (e.g., aircraft dead on the ramp, aircraft with engines running at an airport, aircraft airborne at 200 feet, etc.). (A sample set of initial conditions is shown in figure 7-10.) The IC sets provide a fairly broad range of starting points for various instructional activities and save instructor setup time.

a. If none of the permanent IC sets meets requirements. individual parameters can be temporarily changed by the instructor. Each set of initial conditions contains items/parameters and three command lines. For any sat of conditions (e.g.. the permanent IC's. IC's from auto training programs), the instructor CM retain specific parameters and can modify the value of the remaining items; change X-Y location, add/delete fuel (at zero pounds of fuel, the engine flames out: amount of fuel onboard affects the center of gravity). change OAT, change wind direction (WD) and wind velocity (WV), etc. In addition, the instructor can build a set of temporary conditions to wet a specific training requirement. In this way, the instructor can design a temporary set of conditions to establish and control all parameters of the training period.

b. Initial conditions sets are accessed through the keyboard at the IOS index of permanent IC sets appears on CRT page 100. The specific characteristics of a given set can be displayed for review (or modification) by keying in its line number and depressing DISPL on data entry keyboard. (Refer to table 7-5 for the range of values for each parameter/item.) If review or modification is not necessary, an IC set can be entered directly into the simulation by keying in its 3-digit identifier code and depressing ENTER. IC sets can be displayed for review at any time, but the CMS rust be in FREEZE to enter an IC.

c. The initial conditions set is used to place the CMS in the desired geographical location and configuration to start training, to move the CMS to a new location and/or configuration during training, end to establish or modify a given IC set to suit particular training needs (e.g., change altitude, airspeed, heading. fuel weight, turbulence, etc.).

NOTE

multiple-page IC's (101A. 101B, etc.) can be brought up by depressing the PAGE FWD switchlight on the data entry keyboard.

MET 00:00:00 INDEP 5
AMI 0 TEE 0 IC -2
REPLAY: RECORD :00:00
FROZEN:

RA 0 ALT 512
AS 0 VS 0 HDG 274
NR 100 T01 18 T02 18

ROCKET-P-OFF -C-NORM- 0
GUN -P-OFF -C-NORM- 0
MISSLE-P-OFF -C-ON - 0

P- 0.000-100.000-225.000
C- 0.000-110.000
STUDENT 0 EVENT 0

0 INDEX

DISP	SUBJECT	PAGE
1	INIT/CURR COND	100
2	MALFUNCTIONS	200
3	GRAPHICS	300
4	DEMOS/AF/RP	400
5	TARGETS	500
6	NAV/COMM	600
7	700 SERIES INDEX	700
8	800 SERIES INDEX	800
9	PREP & TEST	900

:00:00 PAGE 100A

INITIAL CONDITIONS/CURRENT CONDITIONS INDEX

PILOT/INTEGRATED

	101	11P JC 1. POWER OFF. ON THE GROUND IN 3X10 VDB
	102	11P JC 2. POWER ON. ON THE GROUND IN 3X10 VDB
	103	11P JC 3. AIRBORNE WITH 20 KTS AIRSPEED IN 3X10
	104	11P JC 4. AIRBORNE WITH 30 KTS AIRSPEED IN 3X10
	105	11P JC 5. AIRBORNE IN HOVER IN 3X10 VDB
	106	11P JC 6. AIRBORNE NORTH OF AIRFIELD FOR GCA
	107	11P JC 7. AIRBORNE IN HOVER AT 800 FT AGL, DAY
	108	11P JC 8. AIRBORNE IN HOVER AT 800 FT AGL, NIGHT
E	109	
	110	ARMY TRNG SCENARIO 1 JC. INTEG MODE, DAYTIME
E	111	
E	112	
E	113	
E	114	
	115	3X10 MISSION PRIMARY JC. HOVER AT 10 FT NEAR BP

M - TEMPORARY, MODIFIED SET
E - EMPTY, NON-PERMANENT SET

(PAGE FORWARD FOR CONTINUATION)

Figure 7-9. Initial Conditions/Current Conditions Index Page Display (Sheet 1)

MET 00:00:00 INTEG 2 :00:00
AMI 0 TEE 0 IC -1
REPLAY: RECORD :00:00
FROZEN:

RA 1993 ALT 2507
AS 0 VS 0 HDG 19
NR 100 TQ1 17 TQ2 17

ROCKET-P- NORM-C- NORM 0
GUN -P- FXD -C- NORM 320
MISSLE-P- ON -C- ON - 8
P- 0.000-137.800-300.000
C- 0.000-110.000
STUDENT 0 EVENT 0

100 IC/CC INDEX

101-135 PILOT/INTEGRATED IC SETS

136-145 CPG IC SETS

150-151 CURRENT COND

160 PARAMETER FREEZE/ SYSTEM RESTORE/ TADS/PNVS PNT IND

170 COCKPIT DISCREP

180 FLIGHT MONITOR

190 VISUAL MODE HELP

PAGE 100B

INITIAL CONDITIONS/CURRENT CONDITIONS INDEX

116
E 117
E 118
E 119
120
E 121
E 122
E 123
E 124
E 125
E 126
E 127
E 128
E 129
E 130
E 131
E 132

M - TEMPORARY, MODIFIED SET
E - EMPTY, NON-PERMANENT SET

(PAGE FORWARD FOR CONTINUATION)

Figure 7-9. Initial Conditions/Current Conditions Index Page Display (Sheet 2)

```
MET    00:00:00     INTEG  2 :00:00                                                    PAGE  100C
AMI    0   TEE    0   IC   -1              INITIAL CONDITIONS/CURRENT CONDITIONS INDEX
REPLAY:  RECORD        :00:00
FROZEN:                            E   133

RA        1993    ALT      2507        134
AS   0     VS    0      HDG    19
NR  100  TQ1    17  TQ2     17     E   135

                                       CO-PILOT GUNNER

                                   E   136

                                       137
ROCKET-P- NORM-C- NORM-       0
GUN    -P- FXD -C- NORM-   320         138
MISSLE-P- ON  -C- ON  -       8
P-   0.000-137.800-300.000             139
C-   0.000-110.000
STUDENT     0      EVENT     0         140

                                   E   141
100       IC/CC INDEX
                                       142
101-135 PILOT/INTEGRATED
          IC SETS                      143

136-145 CPG IC SETS                    144

150-151  CURRENT COND                  145

160       PARAMETER FREEZE/            150  CURRENT CONDITIONS
          SYSTEM RESTORE/
          TADS/PNVS PNT IND            160  PARAMETER FREEZE / SYSTEM RESTORE /
                                            TADS/PNVS POINT INDICATOR
170       COCKPIT DISCREP
                                       170  COCKPIT DISCREPANCIES
180       FLIGHT MONITOR
                                       180  FLIGHT MONITOR
190       VISUAL MODE HELP
                                       190  VISUAL MODE HELP
```

Figure 7-9. Initial Conditions/Current Conditions Index Page Display (Sheet 3)

```
MET  00:00:00   INTEG  2
AMI   0  TEE   0  IC  -1
REPLAY:  RECORD    :00:00
FROZEN:

RA      1993   ALT    2507
AS   0    VS   0    HDG  19
NR  100  TQ1    17  TQ2   17

ROCKET-P- NORM-C- NORM    0
GUN    -P- FXD -C- NORM-  320
MISSLE-P- ON  -C- ON  -    8
P-   0.000-137.800-300.000
C-   0.000-110.000
STUDENT    0      EVENT    0

100       IC/CC INDEX

101-135 PILOT/INTEGRATED
          IC SETS

136-145 CPG IC SETS

150-151  CURRENT COND

160       PARAMETER FREEZE/
          SYSTEM RESTORE/
          TADS/PNVS PNT IND

170       COCKPIT DISCREP

180       FLIGHT MONITOR

190       VISUAL MODE HELP
```

```
:00:00                    INITIAL CONDITIONS                     PAGE   101A
                          SET #    1
 AIRCRAFT                                     ENVIRONMENTAL
 01  RADAR ALT                   0 FT         30  BARO PRESSURE        29.92  IN
 03  AIRSPEED                    0 KTS        31  OUTSIDE AIR TEMP        22  DEG
 04  HEADING                   199 DEG        32  WIND DIRECTION         150  DEG
 05  FUEL                     2400 LBS        33  WIND VELOCITY            5  KTS
 06  WEAPONS LOAD #              1            34  VERTICAL GUST            0  KTS
 07  ENG STATUS                FLY            35  HORIZONTAL GUST          0  KTS
     PRESENT POS     21SWK1558065709          36  TURBULENCE LEVEL     0
 08  10 METER RESOLUTION                      37  SOUND LEVEL              2
 09   1 METER RESOLUTION                      38  ICING ENABLE        OFF
     MAG VAR              W   19 DEG
                                              LIGHTING
                                              39  AIRBASE/CULTURAL         5
 VISUAL                                       40  RUNWAY LIGHTS            5
 21  VISUAL MODE(SEE PG 190)     2            41  APPROACH LIGHTS          5
     1,2,3 INTEG  4,5 INDEP                   42  VASI                ON
 22  SCENE ILLUMINATION        5              43  STROBE              ON
     (1)DAWN (2)0 SUN (3)30 SUN               44  BEACON              ON
     (4)60 SUN (5)90 SUN (6)120 SUN           45  FARP                     5
     (7)150 SUN (8)180 SUN (9)DUSK            46  TODENDORF AND            5
     (10)NIGHT-STARS (11)NIGHT-MOON                EXTRANEOUS BUILDINGS
 23  VISIBILITY            75000  METERS
 24  CEILING                   0  FT MSL
 25  CLOUD TOPS                0  FT MSL
 26  HORIZON GLOW              0
 27  SCUD                    OFF
 28  RANDOM VIS              OFF
 29  FARP #                    2              COMMANDS
                                              53  EXTRACT CURRENT
                                                  STATE AS IC
                                              54  SAVE DISPLAYED           0
                                                  DATA AS IC #
                                              55  EXECUTE DISPLAYED IC

 USE PAGE FWD OR PAGE BK TO ACCESS IC PAGE B
```

Figure 7-10. Initial Conditions Page Display (Sheet 1)

```
MET  00:00:00    INTEG  2  | :00:00                                                       PAGE  101B
AMI   0  TEE   0  IC   -1  |                    INITIAL CONDITION WAYPOINTS
REPLAY:  RECORD    :00:00  |                              SET #   1
FROZEN:                    |
                           |        DOPPLER NAVIGATION                          WAYPOINT/TARGETING
RA      1993  ALT    2507  |
AS   0    VS   0    HDG  19|
NR 100  TQ1    17  TQ2   17|  01  DOPP DEST (1)   21SWK05505550        20  FCC WAYPT (0)    21SVK97505900
                           |  02  DOPP DEST (2)   21SVK90635546        21  ALT                 512  FT
                           |  03  DOPP DEST (3)   21SVK97505900        22  FCC WAYPT (1)    21SVK94495582
                           |  04  DOPP DEST (4)   21SWK05505880        23  ALT                 512  FT
                           |  05  DOPP DEST (5)   31NAL66020000        24  FCC WAYPT (2)    21SVK94365517
                           |  06  DOPP DEST (6)   31NAL66020000        25  ALT                 512  FT
                           |  07  DOPP DEST (7)   31NAL66020000        26  FCC WAYPT (3)    21SWK00396058
ROCKET-P- NORM-C- NORM    0|  08  DOPP DEST (8)   31NAL66020000        27  ALT                 712  FT
GUN   -P- FXD -C- NORM  320|  09  DOPP DEST (9)   31NAL66020000
MISSLE-P- ON  -C- ON  -   8|  10  DOPP DEST (0)   31NAL66020000
P-  0.000-137.800-300.000  |
C-  0.000-110.000          |  11  HOME      (H)   21SWK15956450
STUDENT    0    EVENT    0 |

100      IC/CC INDEX

101-135  PILOT/INTEGRATED
         IC SETS

136-145  CPG IC SETS                                                   COMMANDS

150-151  CURRENT COND                                                  53  EXTRACT CURRENT
                                                                           STATE AS IC
160      PARAMETER FREEZE/    USE PAGE BCK TO ACCESS IC PAGE A         54  SAVE DISPLAYED          0
         SYSTEM RESTORE/      USE PAGE FWD TO ACCESS NEXT IC SET           DATA AS IC #
         TADS/PNVS PNT IND                                             55  EXECUTE DISPLAYED IC

170      COCKPIT DISCREP

180      FLIGHT MONITOR

190      VISUAL MODE HELP
```

Figure 7-10. Initial Conditions Page Display (Sheet 2)

Table 7-5. Range of Values for Initial conditions Line Entries

Line number	Item description	Range of value	Metric/ Increment
	INITIAL CONDITIONS PAGE 101A		
01	RADAR ALTITUDE	0 - 1500	Feet AGL
03	AIRSPEED	0 - 299	Knots
04	HEADING	001 - 360	Degrees
05	FURL	0 - 2509	Pounds
06	WEAPONS LOAD #	1 - 15	
07	ENG STATUS	ON/OFF	
08	PRESENT POSITION 10 METER RESOLUTION	21S VK 8000 5000	UTM
09	PRESENT POSITION 1 METER RESOLUTION	21S VK 80000 50000	UTM
	MAG VAR	00 - 99 E/W	Degrees
21	VISUAL MODE	1 -5	--
22	SCENE ILLUMINATION	1 - 11	
23	VISIBILITY	0 - 99,999	Meters
24	CEILING	0 - 50000	Feet MSL
25	CLOUD - TOPS	0 - 50000	Feet MSL
26	HORIZON GLOW	0 -5	0 - off 5 - max
27	SCUD	ON/OFF	--
28	RANDOM VIS	ON/OFF	--
29	FARP #	1 - 10	--
30	BAR0 PRESSURE	28.00 - 31.00	Inches of mercury
31	OUTSIDE AIR TEMP	-40 - +62	Degrees of centigrade
32	WIND DIRECTION	015 - 360	15-degree increments

Table 7-5. Range of Values for Initial Conditions Line Entries - Continued

Line number	Item description	Range of value	Metric increment
	INITIAL CONDITIONS PAGE 101 - Continued		
33	WIND VELOCITY	0 - 30	l-knot increments
34	VERTICAL GUST	0 - 25	5-knot increments
35	HORIZONTAL GUEST	0 - 25	S-knot increments
36	TURBULENCE LEVEL	0 - 5	0 = off 5 = max
37	SOUND LEVEL	0 - 5	0 - off 5 = max
38	ICING ENABLE	ON/OFF	--
39	AIRBASE/CULTURAL	0 - 5	0 - off 5 = max
40	RUNWAY LIGHTS	0 - 5	0 = off 5 = max
41	APPROACH LIGHTS	0 - 5	0 - off 5 = max
42	VASI	ON/OFF	--
43	STROBE	ON/OFF	--
44	BEACON	ON/OFF	--
45	FARP	0 - 5	0 = off 5 = max
46	TODENDORF AND EXTRANEOUS BUILDINGS	0 - 5	0 = off 5 = max

Table 7-5. Range of Values for Initial Conditions Line Entries - Continued

Line number	Item description	Range of value	Metric/ increment
	INITIAL CONDITIONS PAGE 101A - Continued		
53	EXTRACT CURRENT STATE AS IC	--	--
54	SAVE DISPLAYED DATA AS IC #	1 - 45	
55	EXECUTE DISPLAYED IC	--	--
	INITIAL CONDITIONS WAYPOINTS PAGE 101B		
01 - 10	DOPP DEST	21S WK 2000 5000	UTM
11	HOME	21S VK 8000 8200	UTM
20,22,24,26	FCC WAYPT	21S WK 2000 8200	UTM
21,23,25,27	ALT	0 - 9999	Feet
53,54,55	Same as page 101A		

d. All FCC waypoints (lines 20, 22, 24, and 26) are programmable when operating the CMS In the independent mode. (Refer to paragraph 7-57 for independent mode/missing man operation.)

e. There are three command lines in the lower right-hand corner of each IC page (lines 53, 54, and 55). Lines 53 and 54 provide the capability to save the modified IC set for reuse during the training period or to save any position and state to which the simulator is flown during a period. Line 55 is the command line used to Insert a displayed IC into the simulated environment.

(1) Whatever current conditions exist or have been modified can be extracted as an IC by keying in 53 ENTER while in freeze.

(2) The conditions extracted In step 1 can now be stored in the numerical location designated and can be recalled during the remainder of the period by keying in 54 TAB _ _ (any number 1 through 45) and depressing ENTER. This temporary IC set replaces the set normally stored at that location.

(3) In changing from one IC set to another, it is possible to encounter a situation in which current switch and/or control positions art incompatible with those of the new IC. When this occurs, an alert message appears in the CRT alert area directing the instructor to call up cockpit discrepancy page 170 (figure 7-11): where specific discrepancies are Identified. These must be corrected before the new IC can be accepted by the computer system. If the instructor determines the discrepancy is not critical, depressing FREEZE causes it to override the discrepancy: however, a crash situation may result.

MET 00:00:00 INTEG 2
AMI 0 TEE 0 IC -1
REPLAY: RECORD :00:00
FROZEN:

RA 1993 ALT 2507
AS 0 VS 0 HDG 19
NR 100 TQ1 17 TQ2 17

ROCKET-P- NORM-C- NORM 0
GUN -P- FXD -C- NORM 320
MISSLE-P- ON -C- ON - 8
P- 0.000-137.800-300.000
C- 0.000-110.000
STUDENT 0 EVENT 0

100	IC/CC INDEX
101-135	PILOT/INTEGRATED IC SETS
136-145	CPG IC SETS
150-151	CURRENT COND
160	PARAMETER FREEZE/ SYSTEM RESTORE/ TADS/PNVS PNT IND
170	COCKPIT DISCREP
180	FLIGHT MONITOR
190	VISUAL MODE HELP

:00:00 PAGE 170

COCKPIT DISCREPANCIES

CREWMEMBER	CONTROL NAME	REQUIRED POSITION	CURRENT POSITION
PILOT	AUXILIARY POWER UNIT	OFF	OFF
	DASE YAW	YAW	YAW
	DASE ROLL	ROLL	ROLL
	DASE PITCH	PITCH	PITCH
	FUEL ENG 1	ON	ON
	FUEL ENG 2	ON	ON
	FUEL TRANSFER	OFF	OFF
	FUEL TANK SELECT	NRML	NRML
	GENERATOR NO 1	GEN1	GEN1
	GENERATOR NO 2	GEN2	GEN2
	HARS SELECT	OPR	OPR
	ROTOR BRAKE	OFF	OFF
	FIRE HANDLE ENG 1	IN	IN
	FIRE HANDLE ENG 2	IN	IN
	FIRE HANDLE APU	IN	IN
CPG	FUEL TRANSFER		OFF
	FUEL TANK SELECT		
	FUEL OVRD	PLT	CPG
	FIRE CONTROL COMPUTER	ON	ON
	FCC SYMBOL GENERATOR	FC SYM GN	FC SYM GN
	TADS	TADS	TADS
	PLT/GND OVRD	OFF	OFF
	FIRE HANDLE ENG 1	IN	IN
	FIRE HANDLE ENG 2	IN	IN

Figure 7-11. Cockpit Discrepancies Page Display

7-27. CURRENT CONDITIONS. Current conditions pages 150 and 151 are lists of the current parameters and conditions of the simulated aircraft at any given time while it is being used for training. Parameters being shown are identical to the initial conditions (IC) set while the stimulator is in freeze following initialization. When out of freeze, the current conditions pages reflect the actual state of the simulator.

The status of each of the items/parameters is shown on the currant conditions CRT pages (figure 7-12). Items or parameters with line reference numbers can be modified during training. Host items/parameters can be changed while out of freeze. but to change others, the simulator must be in a freeze state to preclude discontinuities. The current conditions pages contain the following categories:

Aircraft	Tactics
Visual	Miscellaneous
Environmental	Doppler navigation
Lighting	Waypoint/targeting

b. The first four categories cm page 150 are essentially the same on the current conditions page as in the IC sets.

The current conditions page located in group 1 (IC/CC) can be accessed via the data entry keyboard by keying in 150 DISPL. (Ranges of values for each parameter/item are listed In table 7-6.) To modify the following items/parameters, the simulator must be In a freeze state:

Altitude	Line 01/02	
Heading	Line 04	
Weapons load	Line 06	
Present position	Line 08	10 meter resolution
Present position	Line 09	1 meter resolution

NOTE

Random visibility (line 28) is available only if the visibility (line 23) is 2000 feet or below.

NOTE

To change items/parameters when operating in the independent mode, refer to missing man operating paragraph 7-57 and missing man/independent mode display CRT page 175.

d. Two categories of Information/control included on the current conditions page, but not on the initial conditions page, art tactics and miscellaneous. (Refer to tables 7-7 and 7-8.)

e. Any set of current conditions can be saved temporarily by depressing STORE on the IOS forward control panel. This data is then available for recall and relocation by depressing PROB FREEZE and RESET. If the instructor desires to save more than one set of current conditions during a period. they can be saved by designating the sets as a temporary IC set. Up to 45 IC sets can be temporarily saved. To save a temporary IC set from current conditions, perform the following procedures:

```
MET    00:00:00     INTEG  2
AMI     0   TEE    0   IC   -1
REPLAY:  RECORD        :00:00
FROZEN:

RA       1993   ALT     2507
AS   0    VS   0     HDG   19
NR  100  TQ1    17  TQ2    17

ROCKET-P- NORM-C- NORM    0
GUN    -P- FXD -C- NORM-  320
MISSLE-P- ON  -C- ON  -    8
P-   0.000-137.800-300.000
C-   0.000-110.000
STUDENT     0      EVENT    0

100        IC/CC INDEX

101-135  PILOT/INTEGRATED
           IC SETS

136-145  CPG IC SETS

150-151  CURRENT COND

160        PARAMETER FREEZE/
           SYSTEM RESTORE/
           TADS/PNVS PNT IND

170        COCKPIT DISCREP

180        FLIGHT MONITOR

190        VISUAL MODE HELP
```

```
:00:00                 CURRENT CONDITIONS                       PAGE 150

AIRCRAFT                                        LIGHTING
01  RADAR ALT            1993  FT               39  AIRBASE CULTURAL         0
02  ALTITUDE             2507  FT MSL           40  RUNWAY LIGHTS            0
    ALTITUDE             2498  FT PA            41  APPROACH LIGHTS          0
03  AIRSPEED           -    0  KTS              42  VASI                   OFF
04  HEADING                19  DEG              43  STROBE                 OFF
05  FUEL                 2260  LBS              44  BEACON                 OFF
06  WEAPONS LOAD #          2                   45  FARP                     0
    GROSS WT            17097  LBS              46  TODENDORF AND            0
    PRESENT POS    21SWK1558165709                    EXTRANEOUS BUILDINGS
08  10 METER RESOLUTION
09   1 METER RESOLUTION

VISUAL                                          TACTICS
    VISUAL MODE(SEE PG 190)    2                53  WEAPONS DISPERSION     OFF
    1,2,3 INTEG  4,5 INDEP                      54  CUM BORESIGHT ERROR      0
22  SCENE ILLUMINATION         5                    (0)OFF (1)SLOW (2)FAST
    (1)DAWN (2)0 SUN (3)30 SUN                  55  CUM ERROR RESET
    (4)60 SUN (5)90 SUN (6)120 SUN              56  THREAT LETHALITY
    (7)150 SUN (8)180 SUN (9)DUSK                      LEVEL (0-10)          5
    (10)NIGHT-STARS (11)NIGHT-MOON              57  HOSTILITY INTERRUPT    OFF
23  VISIBILITY          60000   METERS
24  CEILING              1000  FT MSL           MISCELLANEOUS
25  CLOUD TOPS          10000  FT MSL           58  STUDENT ID #         0
26  HORIZON GLOW            0                   59  SEAT SHAKER          ON
27  SCUD                  OFF
28  RANDOM VIS            OFF
29  FARP #                  0                   61  FIXED INDEX PG           0
                                                (ENTER 99 TO DESELECT FIXED INDEX PG)
ENVIRONMENTAL
30  BARO PRESSURE        29.92  IN
31  OUTSIDE AIR TEMP        11  DEG
32  WIND DIRECTION         360  DEG
33  WIND VELOCITY            0  KTS
34  VERTICAL GUST            0  KTS
35  HORIZONTAL GUST          0  KTS
36  TURBULENCE LEVEL          0
37  SOUND LEVEL               1
38  ICING ENABLE           OFF
```

Figure 7-12. Current Conditions Page Display (Sheet 1)

MET 00:00:00 INTEG 2 :00:00 PAGE 151
AMI 0 TEE 0 IC -1
REPLAY: RECORD :00:00
FROZEN:

RA 1993 ALT 2507
AS 0 VS 0 HDG 19
NR 100 TQ1 17 TQ2 17

ROCKET-P- NORM-C- NORM 0
GUN -P- FXD -C- NORM 320
MISSLE-P- ON -C- ON - 8
P- 0.000-137.800-300.000
C- 0.000-110.000
STUDENT 0 EVENT 0

100	IC/CC INDEX
101-135	PILOT/INTEGRATED IC SETS
136-145	CPG IC SETS
150-151	CURRENT COND
160	PARAMETER FREEZE/ SYSTEM RESTORE/ TADS/PNVS PNT IND
170	COCKPIT DISCREP
180	FLIGHT MONITOR
190	VISUAL MODE HELP

CURRENT CONDITION WAYPOINTS

DOPPLER NAVIGATION

01	DOPP DEST (1)	16RFK05605610
02	DOPP DEST (2)	16RFK15754623
03	DOPP DEST (3)	16RFK15427615
04	DOPP DEST (4)	31NAL66020000
05	DOPP DEST (5)	31NAL66020000
06	DOPP DEST (6)	31NAL66020000
07	DOPP DEST (7)	31NAL66020000
08	DOPP DEST (8)	31NAL66020000
09	DOPP DEST (9)	31NAL66020000
10	DOPP DEST (0)	31NAL66020000
11	HOME (H)	31NAL66020000
	FLY TO DEST	1

WAYPOINT/TARGETING

20	FCC WAYPT (0)	16RGK20847219
21	ALT	297 FT
22	FCC WAYPT (1)	16RGK15167762
23	ALT	349 FT
24	FCC WAYPT (2)	16RGK15506099
25	ALT	325 FT
26	FCC WAYPT (3)	31NAL66020000
27	ALT	0 FT
28	FCC WAYPT (4)	21SVK00000000
29	ALT	0 FT
30	FCC WAYPT (5)	21SVK00000000
31	ALT	0 FT
32	FCC WAYPT (6)	21SVK00000000
33	ALT	0 FT
34	FCC WAYPT (7)	21SVK00000000
35	ALT	0 FT
36	FCC WAYPT (8)	21SVK00000000
37	ALT	0 FT
38	FCC WAYPT (9)	21SVK00000000
39	ALT	0 FT

Figure 7-12. Current Conditions Page Display (Sheet 2)

Table 7-6. Range of Values for Current Conditions Line Entries

Line number	Item description	Range of value	Metric/ increment
	CURRENT CONDITIONS PAGE 150		
01	RADAR ALTITUDE	0 - 1500	Feet AGL
02	ALTITUDE	0 - 9999	Feet MSL
03	AIRSPEED	0 - 165	Knots
04	HEADING	001 - 360	Degrees
05	FUEL	0 - 2509	Pounds
06	WEAPONS LOAD #	1 - 15	--
07	GROSS WT		
08	PRESENT POSITION 10 METER RESOLUTION	21S VK 8000 5000	UTM
09	PRESENT POSITION 1 METER RES0LUTION	21S VK 80000 50000	UTM
21	VISUAL MODE	1 - 5	--
22	SCENE ILLUMINATION	1 - 11	--
23	VISIBILITY	0 - 99999	Meters
24	CEILING	0 - 50000	Feet MSL
25	CLOUD TOPS	0 - 50000	Feet MSL
26	HORIZON GLOW	0 - 5	0 = off 5 = max
27	SCUD	ON/OFF	--
28	RANDOM VISIBILITY	ON/OFF	--
29	FARP #	1 - 10	--
30	BARO PRESSURE	28.00 - 31.00	Inches of mercury
31	OUTSIDE AIR TEMP	-40 - +62	Degrees centigrade
32	WIND DIRECTION	015 - 360	15-degree Increments

Table 7-6. Range of Values for Current Conditions Line Entries - Continued

Line number	Item description	Range of value	Metric/ increment
	CURRENT CONDITIONS PAGE 150 - continued		
33	WIND VELOCITY	0 - 30	l-knot increments
34	VERTICAL GUST	0 - 25	5-knot increments
35	HORIZONTAL GUST	0 - 25	5-knot increments
36	TURBULENCE LEVEL	0 - 5	0 = off 5 = max
37	SOUND LEVEL	0 - 5	0 = off 5 = max
38	ICING ENABLE	ON/OFF	--
39	AIRBASE CULTURAL	0 - 5	0 = off 5 = max
40	RUNWAY LIGHTS	0 - 5	0 = off 5 = max
41	APPROACH LIGHTS	0 - 5	0 = off 5 = max
42	VASI	ON/OFF	--
43	STROBE	ON/OFF	--
44	BEACON	ON/OFF	--
45	FARP	0 - 5	0 = off 5 = max
46	TODENDORF AND EXTRANEOUS BUILDINGS	0 - 5	0 = off 5 = max

Table 7-6. Range of Values for Current Conditions Line Entries - Continued

Line number	Item description	Range of value	Metric/ increment
	CURRENT CONDITIONS PAGE 150 - continued		
53	WEAPONS DISPERSION	ON/OFF	--
54	CUM BORESIGHT ERROR	0 - 2	--
55	CUM ERROR RESET	ON/OFF	--
56	THREAT LETHALITY LEVEL	0 - 10	--
57	HOSTILITY INTERRUPT	ON/OFF	--
58	STUDENT ID #	0000 - 9999	--
59	SEAT SHARER	ON/OFF	--
	CURRENT CONDITION WAYPOINTS PAGE 151		
01 - 10	DOPP DEST	21S WK 2000 5000	UTM
11	HOME	21S UK 2000 5000	UTM
12	FLY TO DEST	Select # or H	UTM
13	DROP ERROR RESET		-
20,22,24,26,28, 30,32,34,36,38	FCC WAYPOINT	215 VK 8000 8200	UTM
21,23,25,27,29, 31,33,35,37,39	ALTITUDE	0 - 9999	Feet
40	TGT WAYPT SEL	0 - 9	-
41	SLAVE TO TGT WAYPT	ON/OFF	-

NOTE

Lines 12, 40, and 41 are for use In the independent mode to allow PLT IOS access to doppler navigation and FCC waypoint/ targeting information. When accessing lint 12, PLT IOS receives proper command steer Information on HMD, VDU, and HSI for the number selected. When accessing line 40, FCC is alerted to respond to line 41 activation. When line 41 is turned on, PLT IOS receives proper TADS slaving information on HMD, VDU, and HSI for the number selected on line 40.

Table 7-7. Tactics Current Conditions

Title/line No.	Function/use
WEAPONS DISPERSION ON/OFF Line 53	This Instructor-controlled line item permits turning weapons on or off and affects the 30-mm and 2.75 FFAR. In the OFF position, each round fired impacts In the same position, with all variables (flight, environment, range etc.) being equal. In the ON position, rounds impact in a random pattern in and around the impact point consistent with a standard dispersion pattern and limits for the specific weapon. To use, key in 53 ENTER.
CUM BORESIGHT ERROR OFF/SLOW/FAST Line 54	This line permits the instructor to insert a cumulative boresight error at a SLOW or PAST accumulation rate. When error is present, the trainee Initiates boresighting procedures by moving the boresight enable switch to the UP position. The trainee boresight procedures can then be monitored by the instructor. In the OFF position error accumulation stops, but error may still exist. To use, key in 54 TAB 1 for SLOW error accumulation or 54 TAB 2 for FAST error accumulation.
CUM ERROR RESET ON/OFF Line 55	This line permits the instructor to clear any accumulated boresight error.
THREAT LETHALITY LEVEL Line 56	This line permits the instructor to increase the possibility of a hit being scored on the ownship. Range of values is from 0.0 through 10.0 in increments of 1.0. The normal iniltialization value of threat lethality when threat lethality is ON is 5.0. To reduce the possibility of a hit on the ownship, change the threat lethality to a lower value. To increase the chance of a hit, change the threat lethality to a higher value. To use, key in, as an example, 56 TAB 5.0 ENTER.
HOSTILITY INTERRUPT ON/OFF Line 57	When ON and the threat weapon acquires the ownship, the threat algorithm analyzes the variables (LOS, exposure time, range, use of backdrop, and ASE equipment) to determine the possibility of a hit. When OFF, hostile activities are temporarily suspended for all active threats except that search radar is still active. To use, key in 57 ENTER.

Table 7-8. Miscellaneous Current Conditions

Title/line No.	Function/use
STUDENT ID # Line 58	This line permits the instructor to enter the last four digits of the trainee's social security number. The number, when entered, is displayed in the status area of the CRT display and appears on any hardcopies of CRT displays printed during the training period. To use, key in 58 TAB nnnn (where nnnn - 0001 - 9999)
SEAT SHAKER Line 59	This lint permits the instructor to turn the seat shaker on or off. To use, key in 59 ENTER.
FIXED INDEX PG Line 61	Calls up desired index page 30. To use, key in 61 TAB n ENTER, where n = desired index page.
TRNG SEL GUNNERY/TARGET CLEAN/THREAT Line 62	Toggles between GUNNERY/TARGET and CLEAN/THREAT. Instructor has the capability of electing a weapon load and engaging the target. In CLEAN/THREAT, no weapon load is selectable: only dummy loads. Threat targets have interaction on the ownship. Line 62 is accessible only in the independent mode. To use, key in 62 ENTER.

(1) Depress PROB FREEZE.

(2) Key in and display any IC set (pages 101 - 145) (example: 145 DISPL).

(3) Use command line 53 (i.e., key in 53 ENTER); this extracts the current conditions as an IC.

(4) Key in 54 TAB 45 ENTER; this temporarily inserts the set of current conditions in place of IC set 45 on page 145. The condition remains in storage until a raster reset is performed.

7-28. PARAMETER FREEZE. Parameter freeze (PF) enables the instructor to freeze one or more of the flight parameters to current value(s). When a parameter is in freeze state, all other parameters are unaffected. However, all simulator performance and the displays at the IOS reflect the fixed value of the frozen parameter. A parameter can be frozen without respect to whether or not the simulator is in freeze. Thus, a parameter frozen while the simulator is in freeze remains in the freeze state when the simulator freeze is ended.

a. Parameters that can be frozen by the instructor art:

Altitude	Position
Airspeed	Roll
Heading	Pitch
Fuel	Vertical speed

b. The parameter freeze feature is accessed through CRT page 160 (figure 7-13) on the IOS CRT. Parameters that can be frozen art listed by lint number. To freeze a given parameter, key in its line number at the keyboard and depress ENTER. To unfreeze a frozen parameter, repeat the process. The parameter freeze page includes two command lines at the bottom, lines 88 and 99. To freeze all parameters simultaneously, key in 88 ENTER. To clear all frozen parameters, key in 99 ENTER. If all parameters are frozen, individual parameters cannot be selected to be unfrozen. Parameters that have been frozen art displayed in the status area of the CRT.

C. The parameter freeze feature is used to freeze one or more parameters. to reduce trainee task load, to assist the Instructional staff in preparing demonstrations and autofly programs, and to freeze all parameters.

d. In the independent mode of operation, freezing a parameter in one cockpit has no effect on the other cockpit. In integrated mode of operation, freezing a parameter In one cockpit also freezes it in the other.

e. The systems restore controls permit the Instructor to restore a system to its basic state. The systems that can be restored are charge battery (line 21), charge hydraulic accumulator (line 22), align HARS (line 23). and cool FLIR (line 24). Use restore all systems (line 77) to Instantaneously restore the above items (lines 21 through 24).

f. The TADS/PNVS point Indicator display will display point indicator information. It will display TADS, PNVS, or IHADSS, based on user selection. Field of view will display N, M, W, or Z, for narrow, medium, wide, or zoom selections. In addition, the pilot or copilot azimuth and elevation angles are displayed. No pilot or copilot information is displayed when power is off or no selections were made.

7-29. PLIGHT MONITOR. The flight monitor page is a display-only page for monitoring 34 different flight parameters. This page allows the instructor to evaluate trainees performance during the simulation process. The flight monitor page (figure 7-14) is accessed through the data entry keyboard by keying in 180 DISPL, and is included on the IC index page.

7-30. VISUAL MODE HELP PAGE. This Page is a display-only page (figure 7-15) used in conjunction with the IC and CC pages to aid the instructor in determining the correct visual mode for the type of training to be accomplished, either integrated or independent. This page displays visual resources for both the pilot and CPG. The visual mode help page is in group 1 (IC/CC) and can be accessed via the data entry keyboard by keying in 190 DISPL.

7-31. NAVIGATION/ COMMUNICATIONS. The nav/comm facilities pages 601 and 602 define each navigation and communication facility in the gaming area. Each facility is defined by the following:

ID/name	Location
Type	Status
Frequency	

a. The nav/comm facilities pages (figures 7-16 through 7-18) are in group 6 (NAV/COM) and can be accessed via the data entry keyboard by keying in 601 DISPL. CRT page 602 can be accessed by depressing PAGE FWD or by keying in 602 DISPL.

b. To activate/deactivate a facility, key in the facility number and ENTER e.g., keystroke 05 ENTER). This process toggles the status indication on the CRT page. This can also be performed on the tactical instrument gaming area page display (CRT page 341), in the index and control area.

Nav/comm facilities can also be viewed graphically on the tactical instrument gaming area page display (CRT page 341).

7-31.1. UHF-AH Have Quick Radio. The UHF-AH Have Quick radio is page number 610 (Figure 7-18.1). This page can be accessed directly by keying in 610 DISPL, or by pressing PAGE FWD from page 602.

a. The page contains seven lines which are editable by the instructor. These are :

Day of the month (Specifies WOD)
Frequency selection
Anti jam mode selection
Satellite active
Time of day manual entry
Time of day mismatch
UHF jamming signal

b. In addition, the following are displayed at the IOS, but are not editable:

Jammed frequency
Required word of day frequency for channels 15 to 20
Pilot entered word of day frequency for channels 15 to 20
UHF frequency selection
Pilot and CPG VHF frequency selection

```
MET     00:00:00     INTEG   2  :00:00                                                    PAGE  160
AMI      0   TEE    0   IC   -1     PARAMETER FREEZE / SYSTEM RESTORE   / TADS/PNVS POINT INDICATOR
REPLAY:  RECORD        :00:00
FROZEN:
```

```
RA        1993   ALT      2507
AS    0    VS   0     HDG   19
NR  100  TQ1    17  TQ2     17

ROCKET-P- NORM-C- NORM       0
GUN    -P- FXD -C- NORM-   320
MISSLE-P- ON  -C- ON  -      8
P-    0.000-137.800-300.000
C-    0.000-110.000
STUDENT     0       EVENT    0
```

PARAMETER FREEZE | **VALUE**

01	ALTITUDE MSL	2507
02	AIRSPEED	- 0
03	HEADING	19
04	FUEL	2260
05	POSITION	21SWK1558165709
06	ROLL	0
07	PITCH	5
08	VERTICAL SPEED	0

DO NOT UNFREEZE PARAMETERS
WHILE ALL FLIGHT IS FROZEN

88 FREEZE ALL FLIGHT
99 REMOVE ALL FROZEN CONDITIONS

SYSTEM RESTORE

21 CHARGE BATTERY
22 CHRG HYD ACCUM
23 ALIGN HARS
24 COOL FLIR

77 RESTORE ALL SYSTEMS

TADS/PNVS POINT INDICATOR

PILOT TADS
FOV W

CPG TADS
FOV W

PILOT AZIMUTH ANGLE	0
PILOT ELEV ANGLE	0
CPG AZIMUTH ANGLE	0
CPG ELEV ANGLE	0

Figure 7-13. Parameter Freeze Page Display

MET 00:00:00 INTEG 2
AMI 0 TEE 0 IC -1
REPLAY: RECORD :00:00
FROZEN:

RA 1993 ALT 2507
AS 0 VS 0 HDG 19
NR 100 TQ1 17 TQ2 17

ROCKET-P- NORM-C- NORM- 0
GUN -P- FXD -C- NORM- 320
MISSLE-P- ON -C- ON - 8
P- 0.000-137.800-300.000
C- 0.000-110.000
STUDENT 0 EVENT 0

100	IC/CC INDEX
101-135	PILOT/INTEGRATED IC SETS
136-145	CPG IC SETS
150-151	CURRENT COND
160	PARAMETER FREEZE/ SYSTEM RESTORE/ TADS/PNVS PNT IND
170	COCKPIT DISCREP
180	FLIGHT MONITOR
190	VISUAL MODE HELP

:00:00 PAGE 180

FLIGHT MONITOR

LATERAL CYCLIC	4.47	IN.	YAW ACCELERATION	-0.00	R/S2
LONGITUDINAL CYCLIC	5.18	IN.	HDG ANG CHG RATE	-0.00	D/S
COLLECTIVE	0.01	IN.	BALL POSITION	-0.39	BALLS
RUDDER PEDALS	2.21	IN.	SIDE FORCES	0	LBS.
ROLL	0.0	DEG.	SIDESLIP	27.6	DEG.
PITCH	4.8	DEG.	ENGINE 1 TORQUE	62	F-LB
TRUE HEADING	360.0	DEG.	ENGINE 2 TORQUE	62	F-LB
X VELOCITY	0	FPS	ROTOR TORQUE	6045	F-LB
Y VELOCITY	0	FPS	GROUND SPEED	0	FPS
Z VELOCITY	- 0	FPS	LOAD FACTOR	1	G
ROLL RATE	- 0	D/S	ROTOR SPEED	289	RPM
PITCH RATE	0	D/S	VERTICAL VELOCITY	0	F/MN
YAW RATE	- 0	D/S	AIRSPEED	- 0	KTS
X ACCELERATION	0.00	G	ALTITUDE	2507	FT
Y ACCELERATION	0.00	G	OUTSIDE AIR TEMP	11	C
Z ACCELERATION	1.00	G	FUEL ON BOARD	2260	LBS
ROLL ACCELERATION	0.01	R/S2			
PITCH ACCELERATION	0.00	R/S2			

Figure 7-14. Flight Monitor Page Display

MET 00:00:00 INDEP 5
AMI 0 TEE 0 IC 1
REPLAY: RECORD :00:00
FROZEN:

RA 0 ALT 512
AS -5 VS 0 HDG 19
NR 100 T01 18 T02 17

ROCKET-P-OFF -C-NORM- 38
GUN -P-OFF -C-NORM-1200
MISSLE-P-OFF -C-ON - 8

P- 0.000-100.000-225.000
C- 0.000-132.700
STUDENT 0 EVENT 0

100 IC/CC INDEX
101 - 135 PILOT/INTEGRATED IC SETS
136 - 145 CPG IC SETS
150 CURRENT COND
160 PARAMETER FREEZE
170 COCKPIT DISCREP
180 FLIGHT MONITOR
190 VISUAL MODE HELP

:00:00 VISUAL MODE HELP PAGE PAGE 190

VISUAL MODE	MAJOR MODE	PLT VIS RESOURCES	CPG VIS RESOURCES
1	INTEG	PNVS (NIGHT)	TADS FLIR (NIGHT)
2	INTEG	OTW	OTW(2) AND TADS
3	INTEG	PNVS	TADS DTV, DVO, FLIR
4	INDEP	PNVS (NIGHT)	OTW
5	INDEP	OTW OR PNVS	PNVS OR TADS DTV, DVO, FLIR

NOTES:

(1) DVO IS FULL COLOR
(2) DUPLICATE IMAGERY OF PLT OTW
(3) CURRENT VIS MODE DISPLAYED ON PAGE STATUS AREA AFTER MAJOR MODE
(4) BOTH COCKPITS MUST SELECT VISUAL MODE 4 TO TO ACTIVATE INDEPENDENT PNVS OTW

Figure 7-15. Visual Mode Help Page Display

```
MET    00:00:00     INTEG   2 | :00:00                                   PAGE 600
AMI      0   TEE     0   IC  -1
REPLAY:  RECORD        :00:00             NAVIGATION AND COMMUNICATION INDEX
FROZEN:

RA       1993   ALT      2507       601-602  NAVIGATION AND COMMUNICATION
AS   0     VS   0      HDG   19               FACILITIES
NR  100  TQ1     17  TQ2     17
                                    610      UHF-AM HAVE-QUICK RADIO



ROCKET-P- NORM-C- NORM       0
GUN    -P- FXD -C- NORM-   320
MISSLE-P- ON  -C- ON  -      8
P-   0.000-137.800-300.000
C-   0.000-110.000
STUDENT     0      EVENT     0

0        INDEX

DISP   SUBJECT          PAGE

1 INIT/CURR COND    100

2 MALFUNCTIONS      200

3 GRAPHICS           300

4 DEMOS/AF/RP        400

5 TARGETS            500

6 NAV/COMM           600

7 700 SERIES INDEX   700

8 800 SERIES INDEX   800

9 PREP & TEST        900
```

Figure 7-16. Navigation and Communication Index Page Display

MET 00:00:41 INDEP 5
AMI 0 TEE 0 IC 1
REPLAY: RECORD :00:41
FROZEN:

RA 0 ALT 512
AS 0 VS 0 HDG 19
WR 100 T01 11 T02 23

ROCKET-P-OFF -C-NORM- 30
GUN -P-OFF -C-FXD -1200
MISSLE-P-OFF -C-ON - 8

P- 0.000-100.000-225.000
C- 0.000- 32.250
STUDENT 0 EVENT 0

600 NAV/COMM INDEX

601-602 NAV/COMM FAC

610 HAVE-QUICK

:00:00 PAGE 601

INSTRUMENT GAMING AREA
NAVIGATION AND COMMUNICATIONS FACILITIES

	ID/NAME	TYPE	FREQUENCY	LOCATION	STATUS
01	AVH	RBN	333.50	21SVK86305864	FAILED
02	WKI	RBN	341.00	21SVK95836471	FAILED
03	TQS	RBN	499.50	21SVK93407722	FAILED
04	JRO	RBN	489.00	21SVK86447356	FAILED
05	ETF	RBN	211.50	21SVK84286917	FAILED
06	BGN	RBN	345.50	21SVK03556844	FAILED
07	CMM	RBN	481.50	21SWK02536557	FAILED
08	TCJ	RBN	224.50	21SVK93587442	FAILED
09	CFJ	RBN	432.00	21SWK03075695	FAILED
10	PHN	RBN	315.50	21SWK10095696	FAILED
11	HDN/NEUPASS	RBN	226.50	21SWK16105397	ACTIVE
12	MQQ	RBN	357.00	21SWK11096095	FAILED
13	HHX/WITTLICH	RBN	247.00	21SWK16126495	ACTIVE
14	XFH/KURZTAL	RBN	283.50	21SWK12126794	ACTIVE
15	PRM	RBN	286.00	21SWK06127792	FAILED
16	QWQ	RBN	259.50	21SWK11147792	FAILED

PAGE FORWARD FOR CONTINUATION

Figure 7-17. Navigation and Communications Facilities Page 601 Display

MET 00:00:41 INDEP 5
AMI 0 TEE 0 IC 1
REPLAY: RECORD :00:41
FROZEN:

RA 0 ALT 512
AS 0 VS 0 HDG 19
NR 100 T01 11 T02 23

ROCKET-P-OFF -C-NORM- 38
GUN -P-OFF -C-FXD -1200
MISSLE-P-OFF -C-ON - 8

P- 0.000-100.000-225.000
C- 0.000- 32.250
STUDENT 0 EVENT 0

600 NAV/COMM INDEX

601-602 NAV/COMM FAC

610 HAVE-QUICK

:00:00 PAGE 602

INSTRUMENT GAMING AREA
NAVIGATION AND COMMUNICATIONS FACILITIES

	ID/NAME	TYPE	FREQUENCY	LOCATION	STATUS
17	JFC	RBN	442.50	21SWK13147593	FAILED
18	LOG/FELDBERG	RBN	298.00	21SWK16167993	ACTIVE
19	JRO	RBN	1647.50	21SVK87968000	FAILED
20	SDI	RBN	1605.50	21SVK90967700	FAILED
21	TSA	RBN	1737.00	21SVK95157220	FAILED
22	VDH	RBN	1709.50	21SVK94956801	FAILED
23	SBO	RBN	1660.00	21SVK98976981	FAILED
24	RJT	RBN	1730.50	21SVK91936307	FAILED
25	JUT	RBN	1632.00	21SWK03976482	FAILED
26	DMO	RBN	1645.50	21SWK06465546	FAILED
27	HFV	RBN	1716.50	21SVK83515458	FAILED
28	EJQ	RBN	1740.50	21SVK89545757	FAILED
52	VDB	GCA	0	AIRFIELD	OFF

Figure 7-18. Navigation and Communications Facilities Page 602 Display

```
MET    00:00:00     INTEG   2   :00:00                                                   PAGE 610
AMI     0  TEE    0  IC   -1
REPLAY:  RECORD       :00:00                    UHF-AM HAVE-QUICK RADIO
FROZEN:

RA        1993  ALT      2507        01  DAY OF THE MONTH (1-31).  SPECIFIES WOD                 1
AS   0     VS   0      HDG   19          TOD TRANSMITTING FREQENCY/NET NUMBER              0.000 MHZ
NR 100 TQ1    17 TQ2     17          02    FREQUENCY SELECT ( 225.000-399.975 )
                                     03    ANTI-JAM MODE SELECT ( ON/OFF )
                                     04  SATELLITE ACTIVE ( YES/NO )                        NO
                                     05  TOD MANUAL ENTRY ( YES/NO )                        NO
                                     06  TOD MISMATCH     ( YES/NO )                        NO
                                     07  UHF JAMMING SIGNAL ( ON/OFF )                      OFF
                                         JAMMED FREQUENCY                                  0.000
ROCKET-P- NORM-C- NORM       0
GUN    -P- FXD -C- NORM    320
MISSLE-P- ON  -C- ON  -      8                UHF-AM HAVE-QUICK PRE-SET FREQUENCIES
P-   0.000-137.800-300.000
C-   0.000-110.000                       CHANNEL          REQUIRED           PILOT ENTERED
STUDENT    0      EVENT    0                                WOD                  WOD
                                                         FREQUENCY            FREQUENCY
                                                           (MHZ)                (MHZ)
600      NAV/COMM INDEX
                                            20              300.050
601-602 NAV/COMM FAC                        19              376.000
                                            18              359.100
610      HAVE-QUICK                         17              314.300
                                            16              297.600
                                            15              287.400

                                            UHF FREQUENCY SELECTION             300.000 MHZ
                                            PLT VHF FREQUENCY SELECTION         137.800 MHZ

                                            CPG VHF FREQUENCY SELECTION         110.000 MHZ
```

Figure 7-18.1 UHF-AH Have Quick Radio Page

7-32. BATTLE POSITION MAPS. The battle position map CRT pages are information displays that provide graphic data related to battle/firing positions and associated target sites and provide the instructor with a 12- by 12-km graphic overview of the ownship and the target engagement area of interest.

a. There are 34 designated battle positions included in the visual gaming area- (Figure 7-19 is a typical battle position MP CRT page 325.) These battle positions each include from one to eight firing positions. The battle positions are designed in 1-kilometer squares and should be entered from only one side of the square kilometer. The battle position is composed of relatively high terrain that overlooks target engagement areas (low terrain containing target sites). Within each battle position are nap-of-the-earth (NOE) routes leading to the firing positions.

b. The battle position raps are always oriented on the CRT display so that magnetic north is up. Each battle position map shows the battle position by number and all of the active target sites within its area of view. Since each battle position has one or more firing positions, several fields-of-fire are available to the trainee. Each battle position has been designed with eight selectable fields-of-fire for the instructor to choose from when viewing the target sites in the target engagement areas.

c. The battle position map CRT pages are in group 3 (GRAPHICS) and can be accessed via the data entry keyboard (CRT pages 301-334). In the index and control area of the CRT page when battle position maps are displayed, control reference numbers are provided to permit selection of fields-of-fire. When the page is first called up, the field-of-fire is defaulted to the entry point. Each battle position has only one entrance side, shown on the map with an index. Starting in the upper right corner of the battle position, the fields-of-fire are numbered 1 through 8 in a clockwise direction. In the control area, reference number 01 is the command far selecting the FIELD OF FIRE number. Reference numbers 02 and 03 are aircraft TRACK ERASE and TRACK RECALL. respectively. Reference number 01 can be entered via the data entry keyboard while the map is displayed (e.g., 01 TAB 6 ENTER), and causes the viewing direction of the field-f-fire to change for the specified battle position. As fields-of-fire are selected (advanced), the map automatically repositions in relation to the battle position to maintain the maximum field-of-view in the direction of the field-of-fire (i.e., when field-of-fire 6 is selected, the battle position is displayed on the left side of the CRT page and centered vertically: when field-of-fire 2 is selected, the battle position is displayed on the right side of the CRT page and centered vertically).

d. The selected sensor system field-of-view is graphically shown by two radii from the ownship, at the battle position, out to 10 kilometers. The angle subtended between the radii is representative of the field-of-view selected for the sensor system (i.e., wide, narrow, medium, or zoom). The radii are dashed lines with a dot every kilometer. (See figure 7-19.)

e. When targets have been selected and positioned on the target sites within a battle position map, target symbols appear on the map. When intervisibility or LAB exists between the ownship and any target(s). the target symbol(s) illuminate in high intensity.

f. Battle position map displays can be used to determine which target sites are in proximity of a battle/firing position, observe the relationship between ownship and active targets, observe graphically when intervisibility exists between the ownship and targets, and determine range from ownship to active targets.

g. The remote designator will be displayed if activated and within the confines of the map.

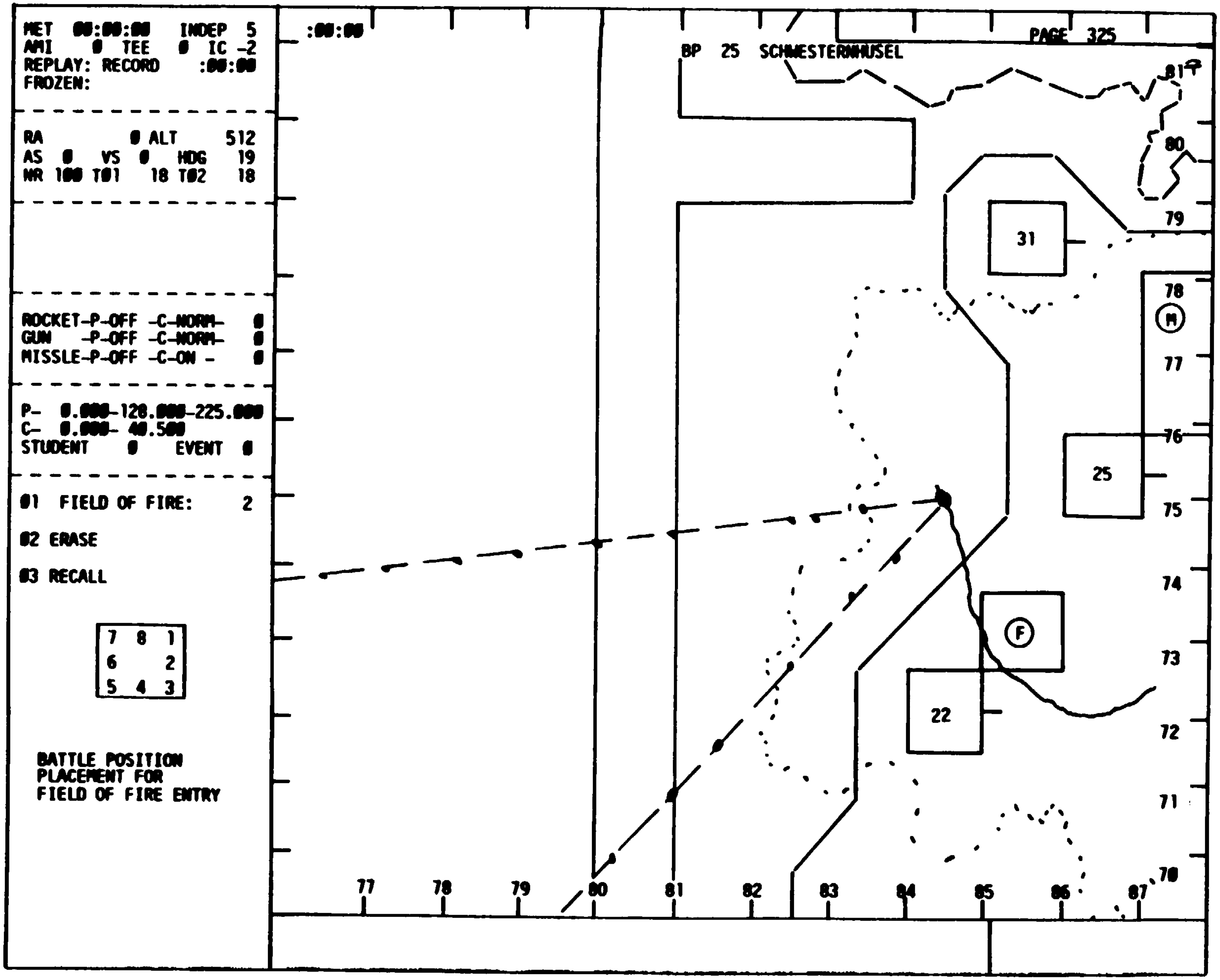

Figure 7-19. Rattle Position Map Page Display

7-33. CROSS-COUNTRY MAP. The cross-country map display is a graphic display of the visual gaming area. It is a horizontal area plot displaying background map data and traces of the aircraft route of flight. It permits the instructor to monitor certain trainee activities and provides information in a graphic form that would be difficult, if not impossible, to provide via standard text.

a. The cross-country map (figures 7-20 and 7-21) includes the following characteristics:

(1) Prominent terrain features.

(2) Active targets (see target symbols).

(3) FARP locations (see symbols).

(4) Two-scale capability:

12 x 12 kilometers with zoom off
6 x 6 kilometers with zoom on

(5) Automatic recentering of ownship.

(6) Ownship ground track trace that provides:

(a) 2O-minute track history.

(b) 3-minute time marks (see symbols).

(c) Event marks along track for:

Malfunctions
Exceeding structural limits,
Object/tree strikes

(d) Track erase.

(e) Track recall.

(7) Ownship symbol.

(8) Remote designator When active and within the confines of the map.

NOTE

Zoom, track erase, and track recall controls are in the index and control area.

b. The cross-country map display is in group 3 (GRAPHICS) and can be accessed via the data entry keyboard by keying in 340 DISPL.

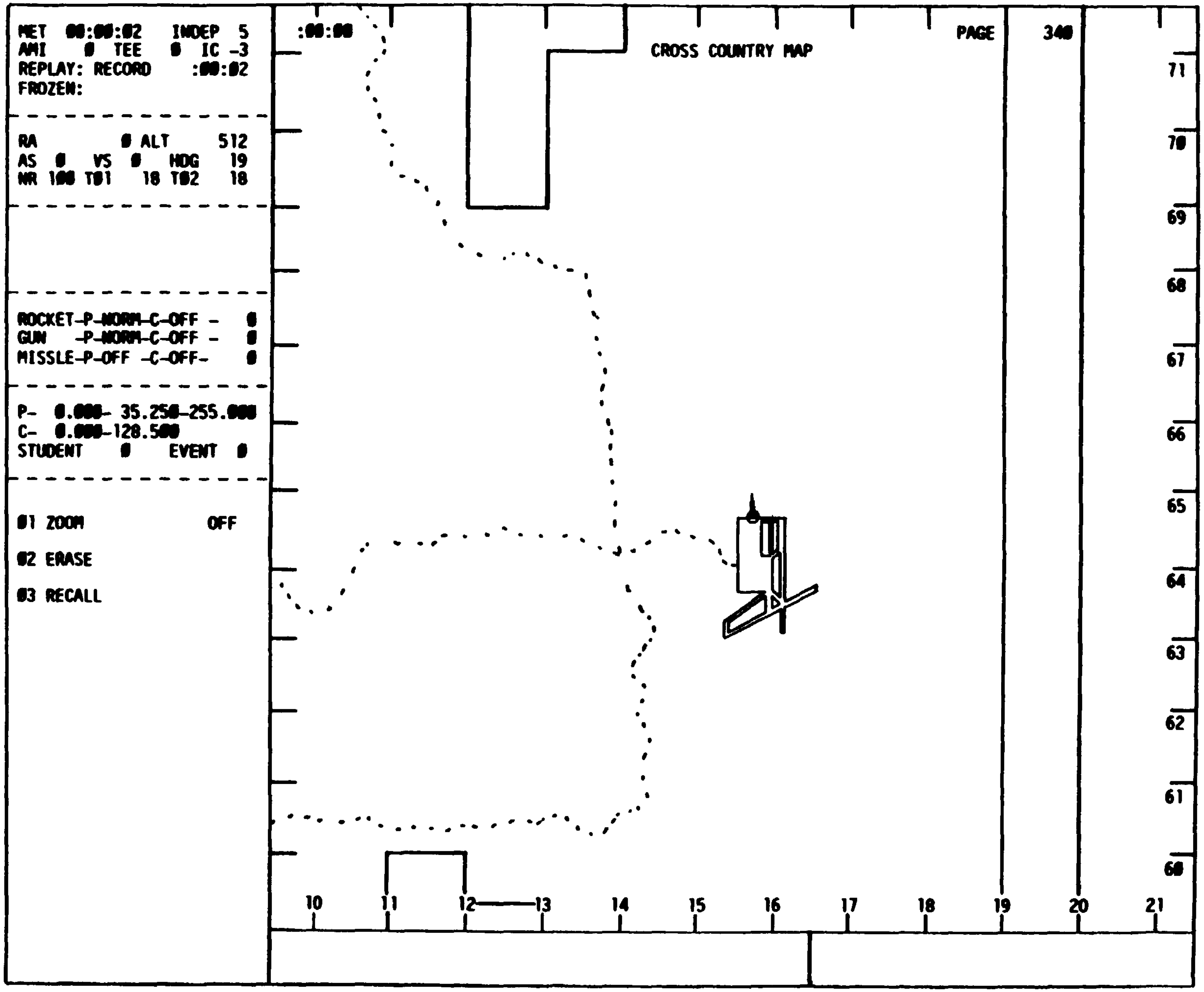

Figure 7-20. Cross-Country Map Page Display

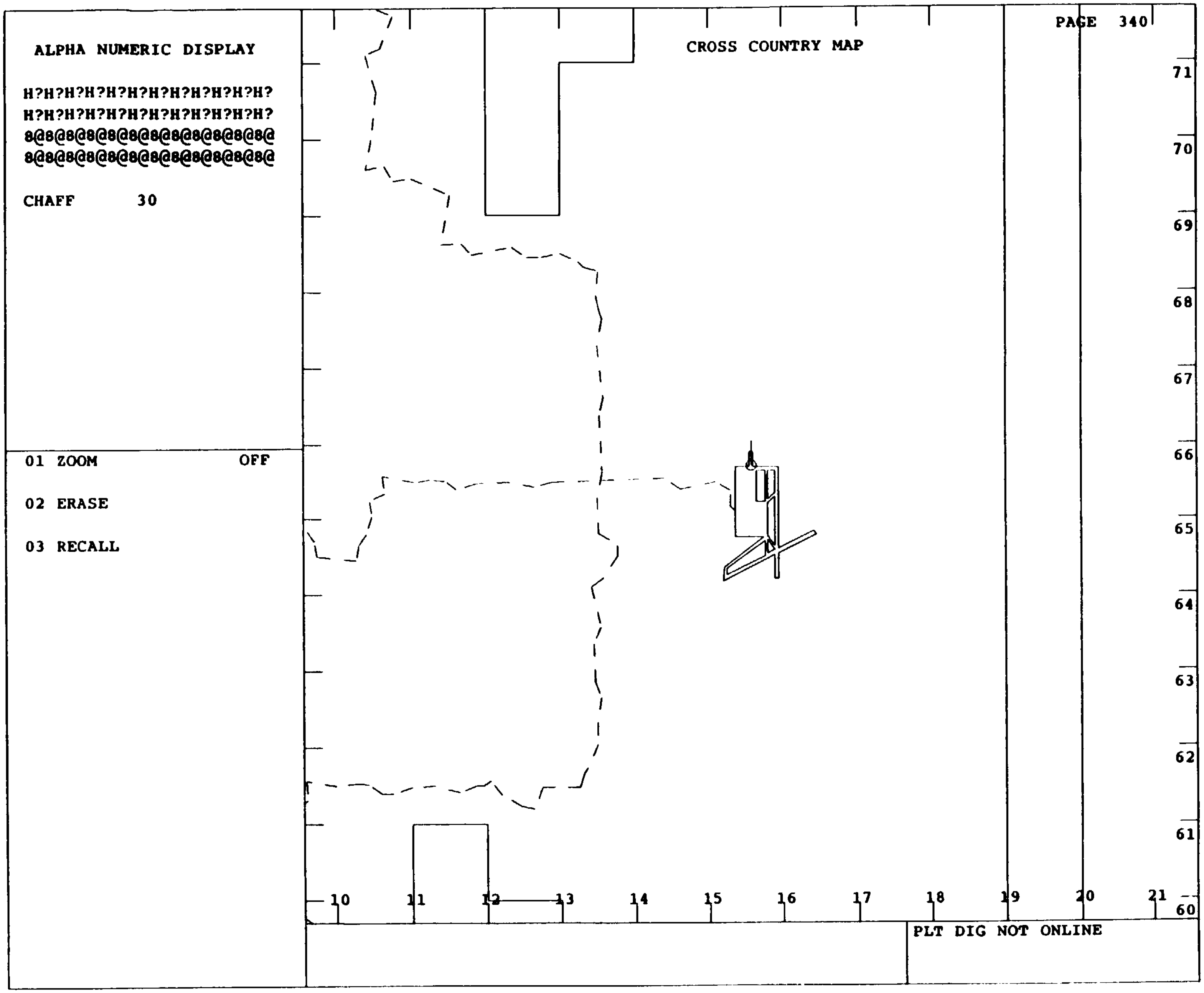

Figure 7-21. Cross-Country Map (Zoom On) Page Display

C. The instructors can use the cross-country map displays to:

Monitor trainee enroute location and route
Maintain general orientation in visual gaming area
Monitor relationship between ownship location and threat
Record locations of object or tree strikes
Record periods of intervisibility and exposure to threat weapons
Show malfunction occurrences
Critique/debrief trainee performance via hardcopy feature

d. When intervisibility exists between the ownship and the target(s). the target symbol is shown in high intensity on the cross-country map.

7-34. TACTICAL INSTRUMENT GAMING AREA DISPLAY. The tactical instrument gaming area display is a graphic overview of the instrument navigational and approach facilities available in the gaming area. It provides the instructor with the capability of monitoring the trainee tactical Instrument route of flight.

a. The display (figures 7-22 and 7-23) includes the following characteristics:

(1) Symbology for nondirectional radio beacons.

(2) Symbology for GCA facilities.

(3) Two scales with a zoom capability (when zoom is on, CRT main page area is cleared, except for ownship symbol):

40 x 32 kilometers with zoom off
6 x 6 kilometers with zoom on

(4) Ownship ground track trace which provides:

(a) 20-minute track history.

(b) 3-minute time marks.

(c) Event marks along track for:

Malfunctions
Exceeding structural limits
Object/tree strikes

(d) Track erase.

(e) Track recall.

(5) GCA select NO.

(6) GCA cancel.

(7) Activate NDB number.

(8) Fail NDB number.

(9) Remote designator.

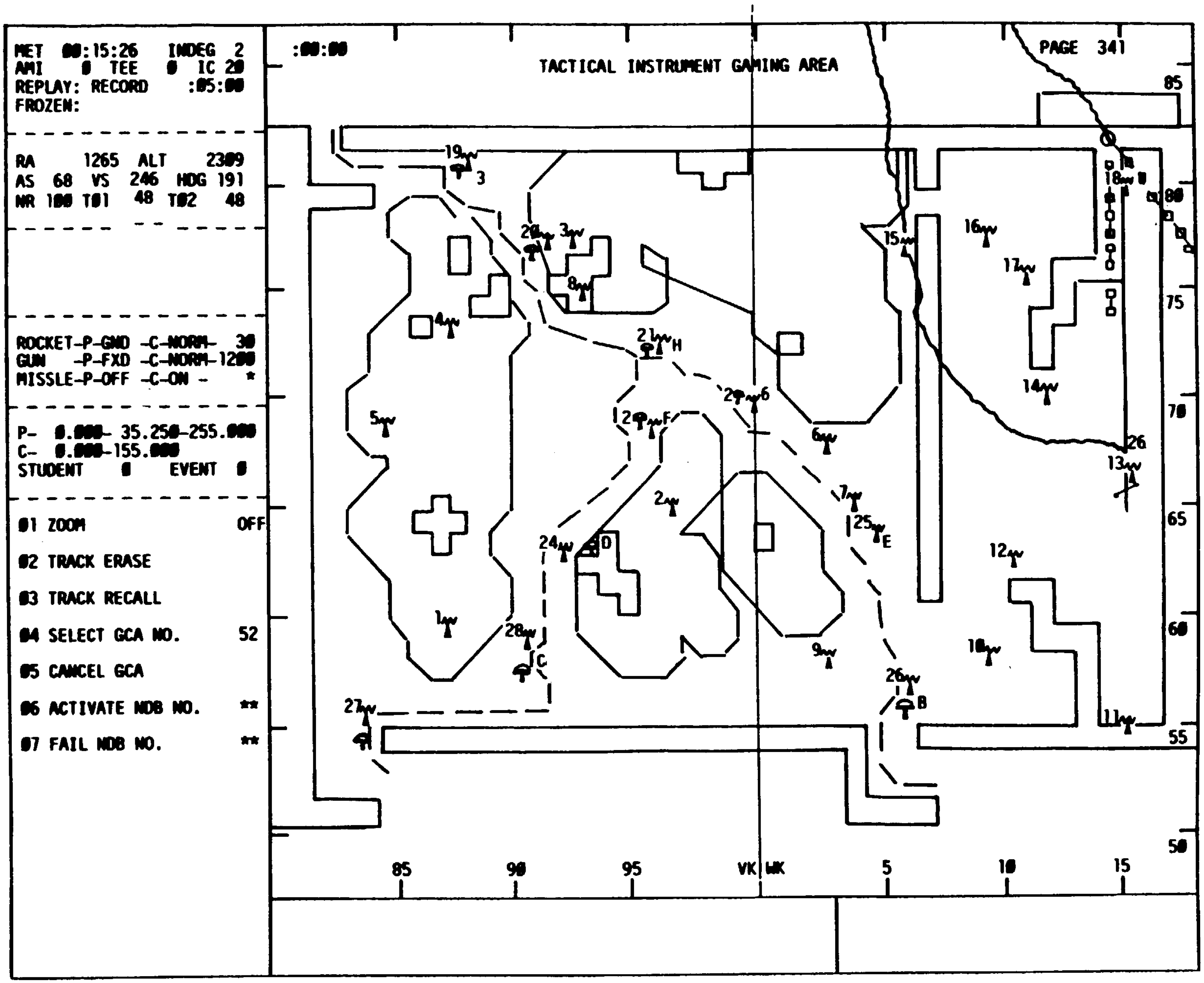

Figure 7-22. Tactical Instrument Gaming Area Page Display

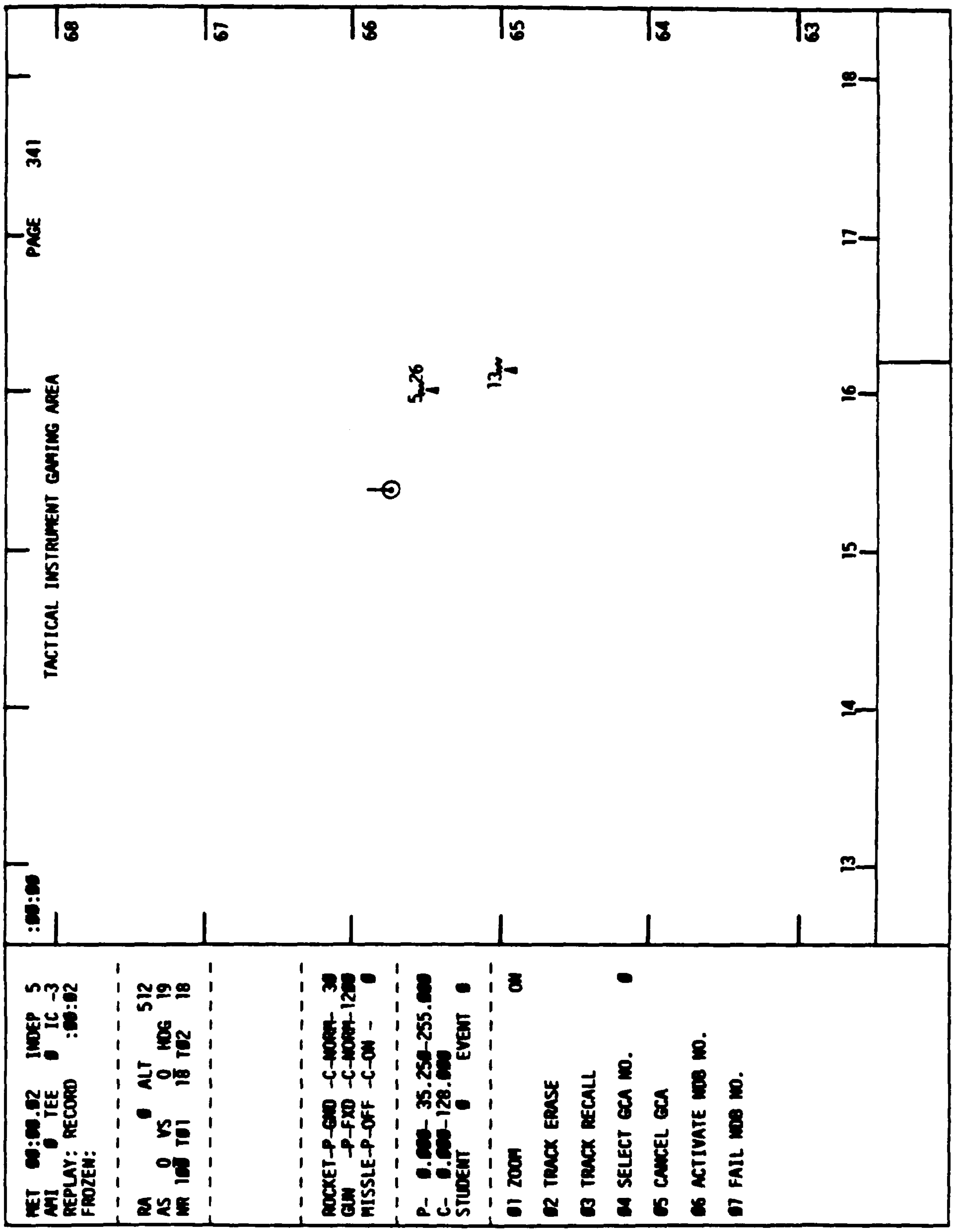

Figure 7-23. Tactical Instrument Gaming Area (Zoom On) Page Display

b. The display is in group 3 (GRAPHICS) and can be accessed via the data entry keyboard by keying in 341 DISPL.

C. Instructors can use the displays to:

Monitor trainee instrument route of flight
Note locations of object or tree strikes
Show malfunction occurrences during instrument flight
Locate and vector ownship to GCA facility
Select or cancel GCA facility
Critique/debrief trainee performance via remote display or hardcopy feature
Activate/fail NDB sites

7-35. MAP SYMBOLOGY. The map symbols shown on the CRT map displays are graphic representations of specific items or objects. They have been provided to enhance the informational value of the map displays and provide timely feedback to the instructor.

a. Types of symbols include the following:

Targets
Target site
FARP location
Navigation aids
Ownship
3-minute time mark
Malfunction
Crash
Prominent points
Kill
Remote designator with 1 km markers
Illumination round burst
Weapon impact points

b. The map symbology CRT display (figure 7-24) lists and shows all the available symbols. The symbols appear on the following graphic display pages:

Target site overview (page 540)
Target site pathway detailed display (page 540)
Battle position target site (pages 541 - 575)
Cross-country map (page 340)
Tactical instrument gaming area (page 341)
GCA (pages 350 - 351)
Gaming area map (page 343)
Battle positions (pages 301 - 334)
Ownship weapons scoring (page 597)
Remote designator (page 582)

The map symbology page is in group 3 (GRAPHICS) and can be accessed via the data entry keyboard and keying in 342 DISPL. (Figure 7-25 illustrates the map symbols employed in the CMS, shown larger than actual size to aid in identification.)

MET 00:00:00 INDEP 5
AMI 0 TEE 0 IC -3
REPLAY: RECORD :00:00
FROZEN:

RA 0 ALT 512
AS 0 VS 0 HDG 19
NR 100 TQ1 18 TQ2 18

ROCKET-P- NORM-C- OFF - 0
GUN -P- FXD -C- OFF - 0
MISSLE-P- ON -C- OFF - 0
P- 0.000-121.500-225.000
C- 0.000-128.000
STUDENT 0 EVENT 0

300 GRAPHICS INDEX

301-334 BATTLE POSITION MAPS
340 CROSS COUNTRY MAP
341 TAC INST GAME AREA
342 MAP SYMBOLOGY
343 GAMING AREA MAP

350-351 GCA PLOTS

360-361 ALT/AS PLOTS

370 DATA ENTRY KYBD + CPG MISSILE CONTROL
371 CPG FIRE CONTROL
372 PILOT MSL+RKT CNTRL
373 PILOT FIRE CONTROL
374 CPG ORT SW POSITION
375 CPG CYC SW POSITION
376 PLT CYC SW POSITION
377 DOPPLER COMPUTER

:00:00 PAGE 342

MAP SYMBOLOGY

AIRCRAFT

AH-64 O

MI-2, MI-24D T
MI-24F, MI-28
MI-17, BO-105
GAZELLE, HOKUM

NAVIGATIONAL AIDS

NDB

NDB/GCA G

MISCELLANEOUS

FARP

1 KM MARKERS *

GLDD +

TARGET SITES ·

BURST

TARGETS

T-80, M-1
T-62, T-72
T-80 RA
T-64 RA
CHIEFTAIN
LEOPARD II
AMX-30

BMP-1, BMP-2
M-3

BTR-60PA ◇
BTR-70, M-113

SA-4,6,8A,8B 4,6,8
SA-11, ROLAND
I-HAWK

SA-9, 13, 14

ZSU-23-4, BM-21
2S1, 2S3, 2S6

LIGHT TRUCK
HEAVY TRUCK

FLAPWHEEL
DOGEAR
STRAIGHT FLUSH

KILLED TGT K

TRACK SYMBOLS

3 MINUTE

MALFUNCTION M

STRUCTURAL LIMIT SL

OBJECT STRIKE OS

DISCREPANCY SEE PAGE 170

Figure 7-24. Map Symbology Page Display

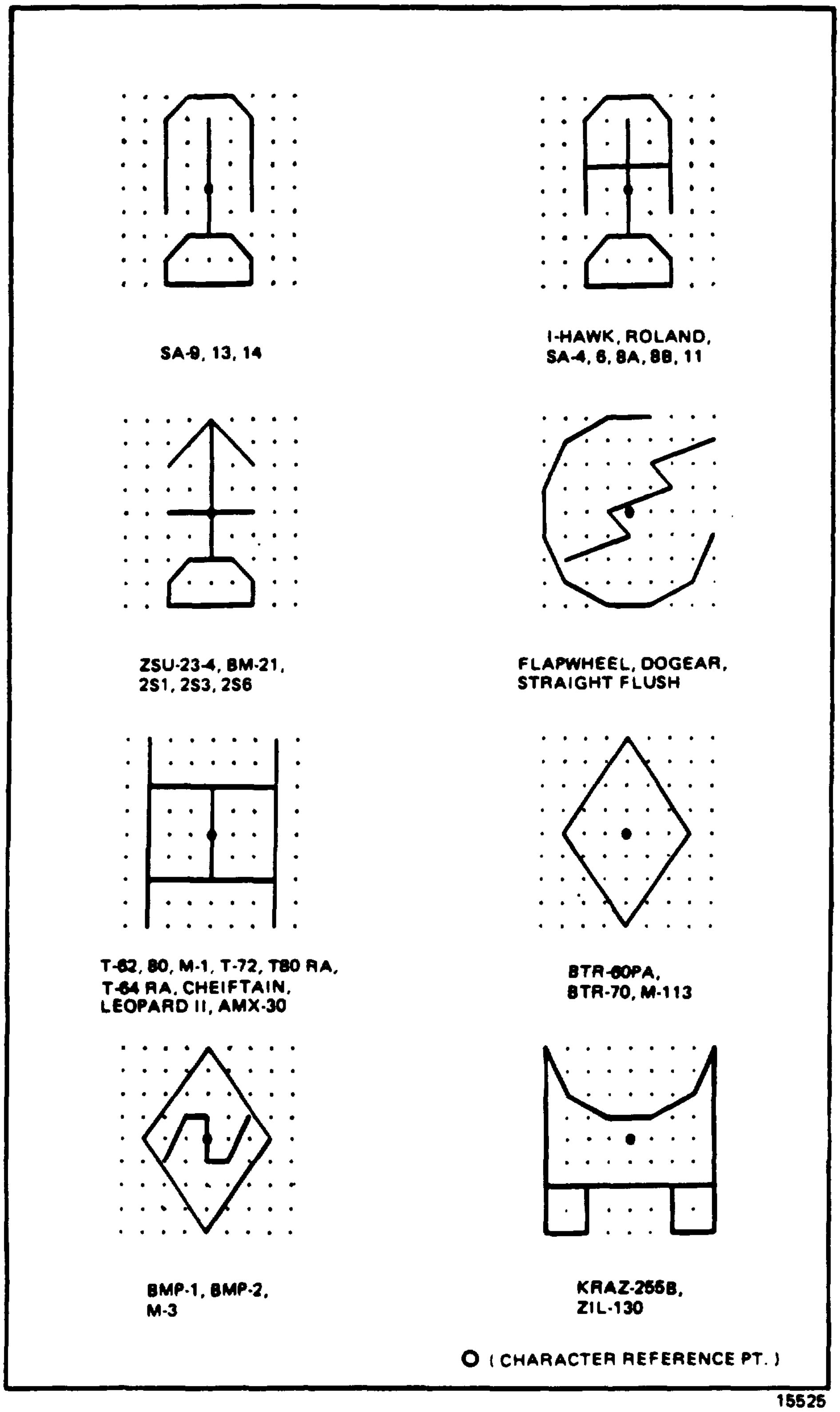

Figure 7-25. Typical Map Symbols (Sheet 1)

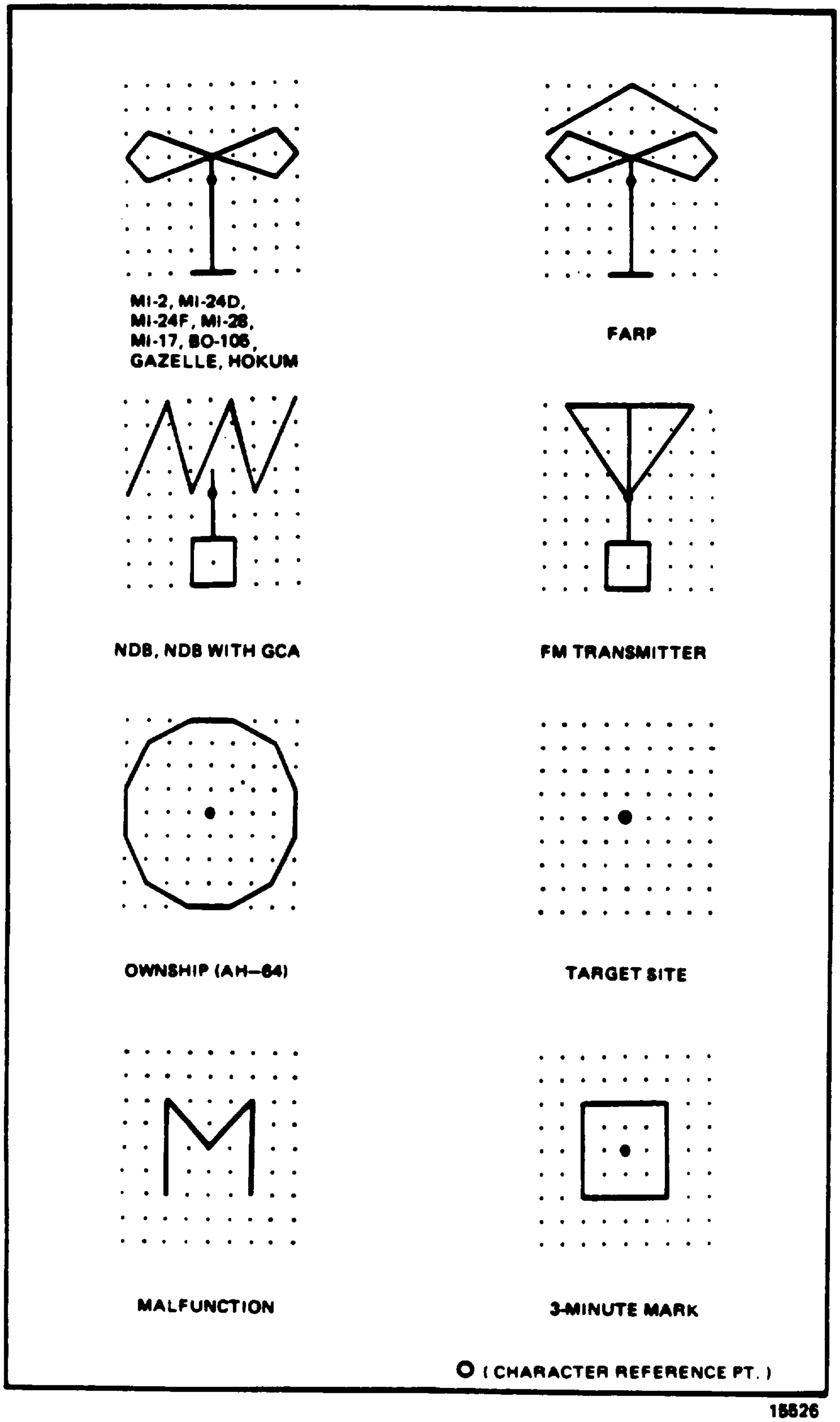

Figure 7-25. Typical Map Symbols (Sheet 2)

d. The symbols art used to:

Identify target types and sites
Identify FARP landing areas
Identify PM transmitters, NDB's, and GCA sites
Identify ownship location
Identify locations of malfunction occurrences
Identify location and cause of crashes
Obtain tine checks along route of flight
Identify the 1 km points on the range lines on the ownship weapon scoring and remote designation pages.
Identify the burst location (illumination round only)
Identify the weapon impact locations

7-36. GCA PLOTS. The ground-controlled approach (GCA) display is a stylized representation of the precision approach radar (PAR) glideslope and centerline. The simulated progress along both paths is displayed using a symbol for the ownship and a track trace. The GCA display provides computer-generated command information required to conduct the final controller portion of a simulated GCA approach. Instructions appearing in the command box on the CRT reflect simulated aircraft position with respect to the final approach path to the runway. The display provides the instructor with a graphic display of the aircraft location in relation to the glideslope and centerline for the approach runway and the alphanumerical commands to be used by the instructor to conduct the GCA.

a. The GCA displays are on CRT pages 350 (figure 7-26) and 351 (figure 7-27). These displays include the following information and characteristics:

Glideslope and centerline deviation track
GCA commands - correction to course, corrections to glideslope
Two scale displays: 10- and 2-nmi
GCA selection and cancellation in index and control area

b. The GCA display pages are in group 3 (GRAPHICS) and can be accessed by keying in 350 DISPL via the data entry keyboard. Access CRT page 351 by depressing PAGE FWD or by keying 351 DISPL. Before calling up the GCA display, the instructor can use the tactical instrument gaming area map to vector the simulated aircraft into the approach course corridor. The NDB can also be used to vector the aircraft into the approach corridor. The GCA window or corridor is approximately a 4500-foot square at 10 nmi on the approach side of the runway extended centerline. The instructor can use the GCA display to conduct GCA approaches to the airfield, to supplement information derived from cockpit instruments and the status area display, and to critique/debrief trainee GCA performance via the remote display or the hard-copy feature.

C. There is only one GCA available, facility No. 52, runway 20, at the airbase. When CRT page 350 is displayed, the index and control area contains command reference lines. To activate the GCA program, key in 01 TAB 52 ENTER on the data entry keyboard. Line 02 permits the instructor to cancel the GCA program. GCA can also be activated by using page 602 line 52 or page 341 line 4. Alternately, the GCA program automatically turns off when the ownship is 15 km outbound from the base.

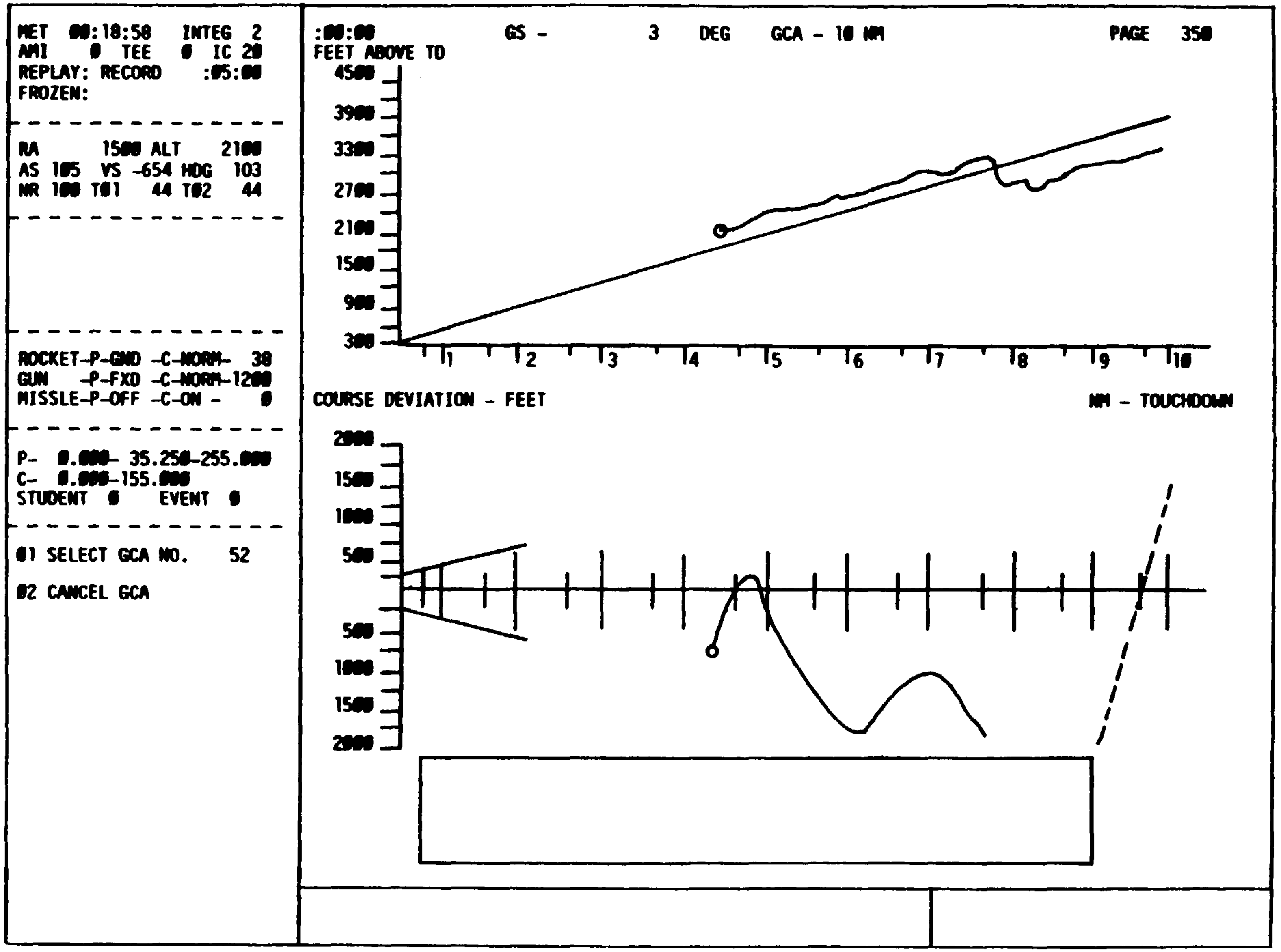

Figure 7-26. GCA 10-Mile Scale Page Display

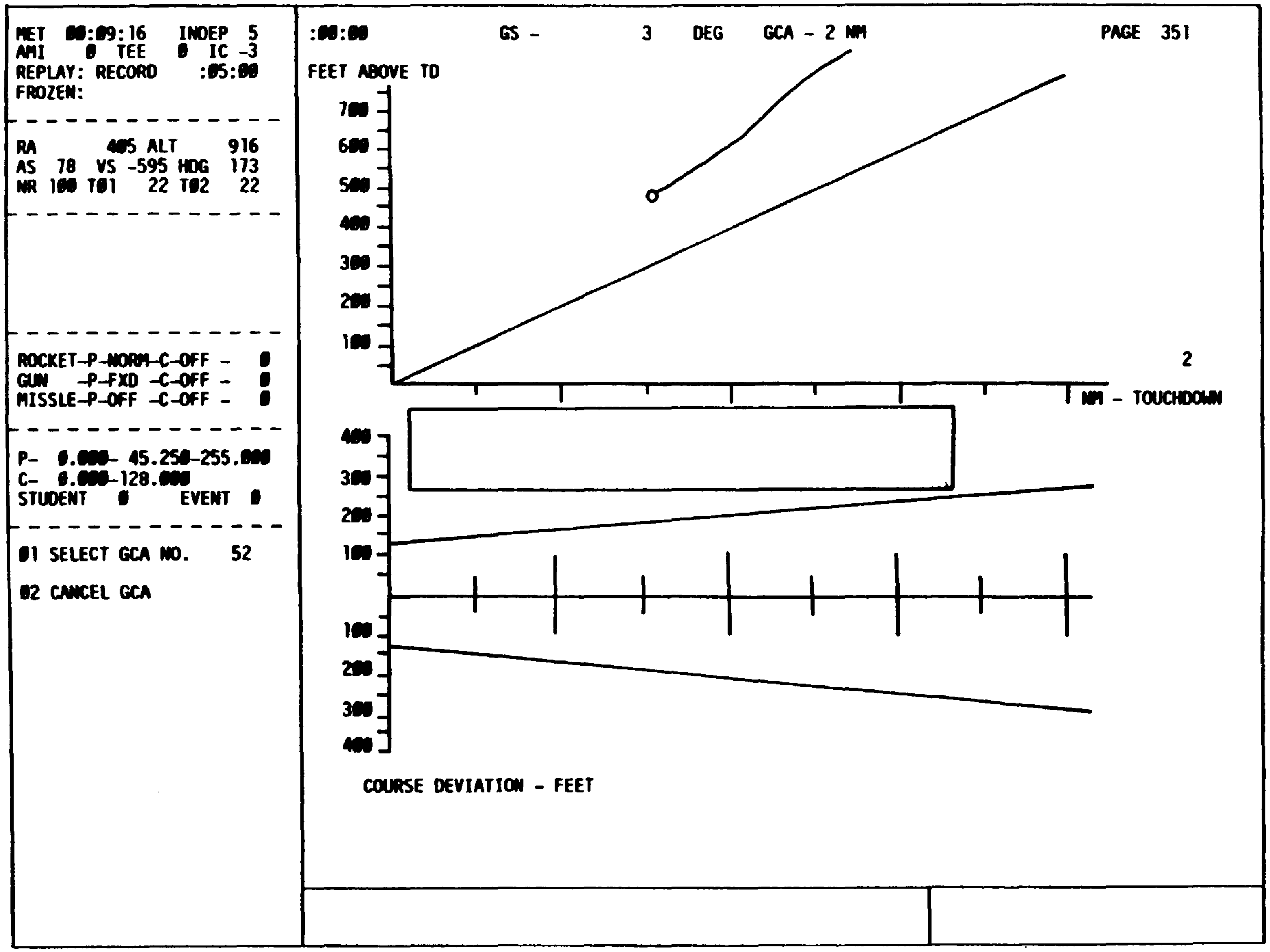

Figure 7-27. GCA 2-Mile Scale Page Display

NOTE

The instructor must ensure that ownship penetrates the upper GCA box displayed on page 341 to receive command information in the command box on GCA pages.

7-37. ALTITUDE/AIRSPEED PLOTS. The altitude/airspeed plots graphically depict a history of aircraft performance related to altitude and airspeed versus distance. The altitude is measured and recorded above obstacles from the surface to a maximum of 200 feet AGL. Airspeed is IAS recorded up to normal cruise speed of the actual aircraft. Distance is selectable by the instructor in two scales. Distance is measured in terms of cumulative movement without respect to direction of such movement .

a. Major characteristics of the plots (sham in figures 7-28 and 7-29) include:

Altitude above ground versus distance
Indicated airspeed versus distance
Two selectable plot scales: 6- and l-km

b. The airspeed/altitude plots are in group 3 (GRAPHICS) and art accessed via the data entry keyboard by keying in CRT page 360 or CRT page 361. Typical uses of the altitude/airspeed plots include:

(1) Monitoring trainee altitude control during enroute navigation:

NOE navigation routes
Tactical instrument routes (under 200 feet only)

(2) Monitoring trainee altitude control in the firing position.

(3) Monitoring trainee airspeed control throughout training missions.

(4) Debriefing/critiquing trainee performance via the hardcopy feature.

7-38. CONTROL PANEL CRT DISPLAYS. The control panel CRT displays are facsimile representations of aircraft cockpit control panels. These displays include the panel title, title and position of each switch, setting of each control, status of each indicator, and value of each readout on the panel represented. The eight control panel displays and their CRT page numbers are:

CPG missile control panel and data entry keyboard (page 370) (figure 7-u))
CPG fire control panel (page 371) (figure 7-31)
Pilot missile control panel (page 372) (figure 7-32)
Pilot fire control panel (page 373) (figure 7-33)
CPG ORT panel (page 374) (figure 7-34)
CPG cyclic control switches (page 375) (figure 7-35)
Pilot cyclic control switches (page 376) (figure 7-36)
Doppler computer display unit (page 377) (figure 7-37)

a. The control panel CRT displays art in group 3 (GRAPHICS) and are accessed via the data entry keyboard by calling up CRT pages 370 through 377. (Refer to the list and associated page numbers above.)

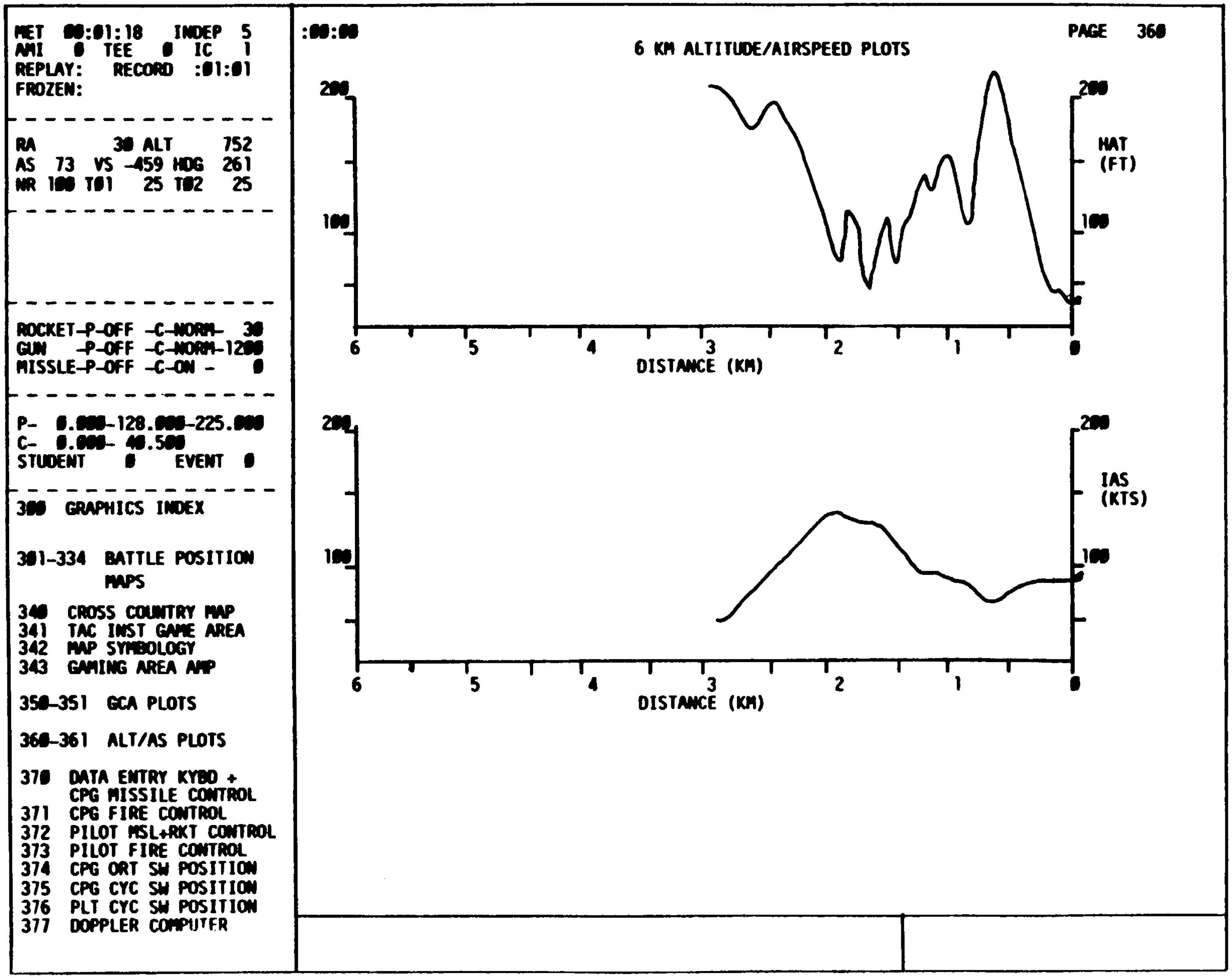

Figure 7-28. 6-KM Altitude/Airspeed Plots Page Display

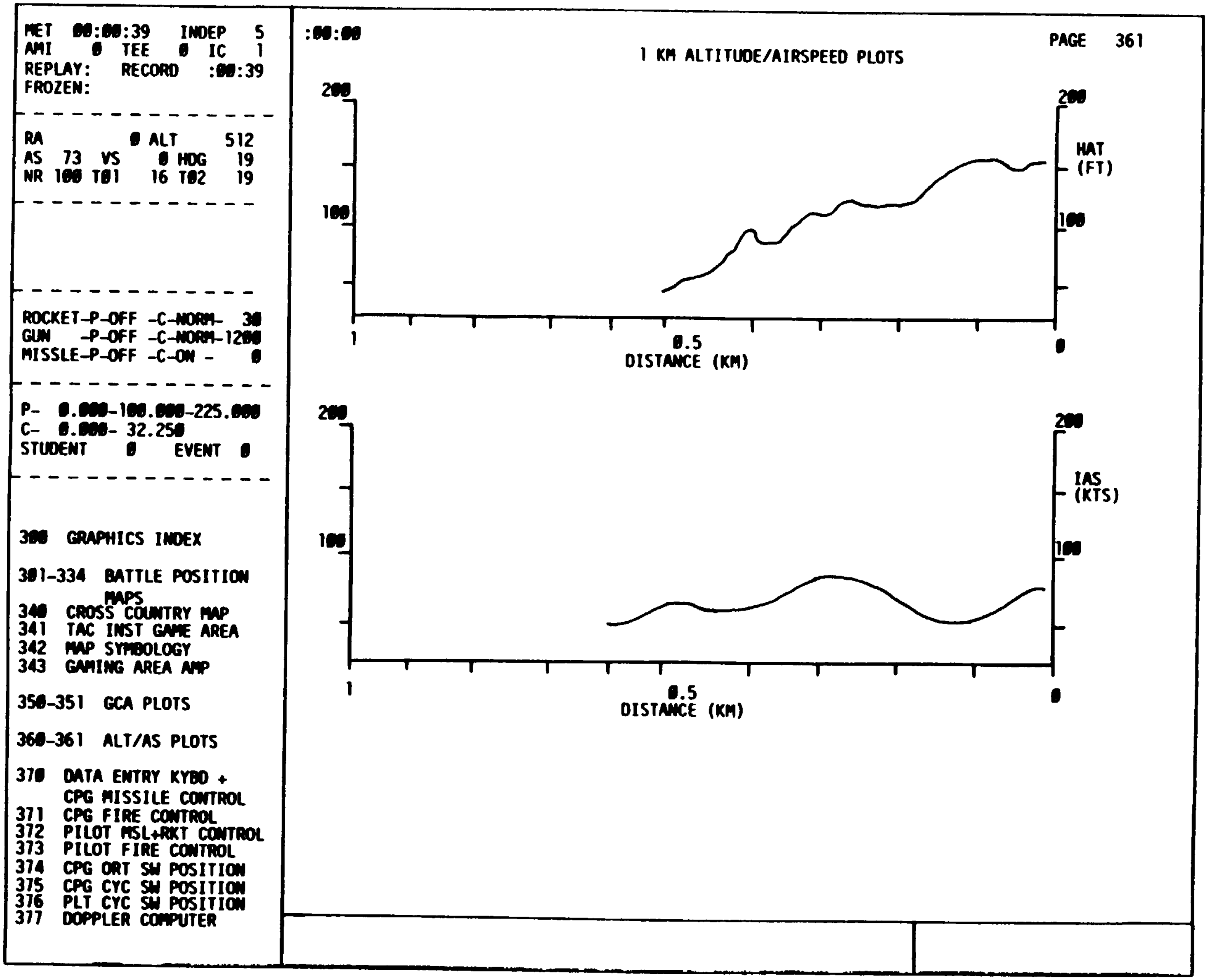

Figure 7-29. 1-KM Altitude/Airspeed Plots Page Display

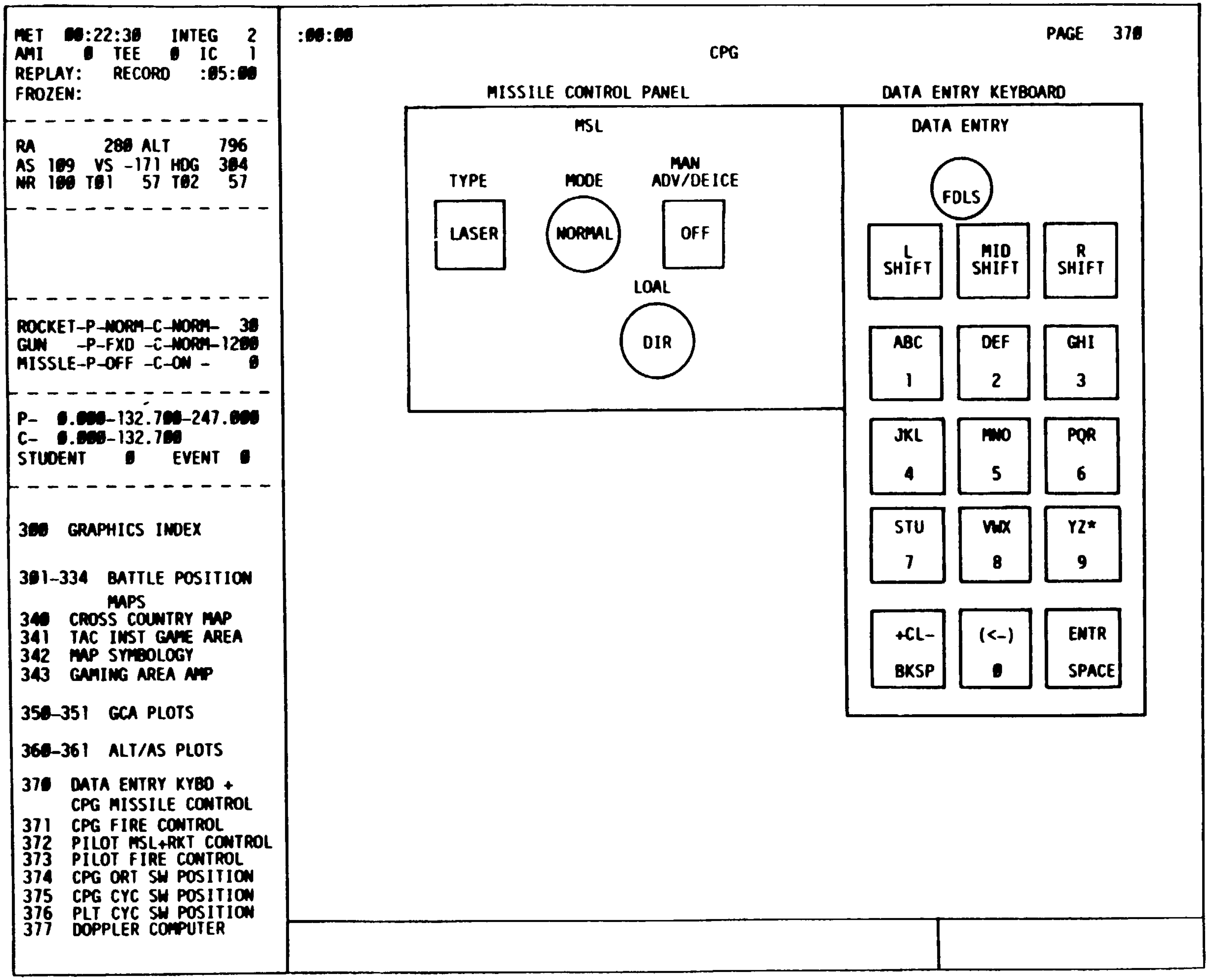

Figure 7-30. CPG Missile Control Panel Page Display

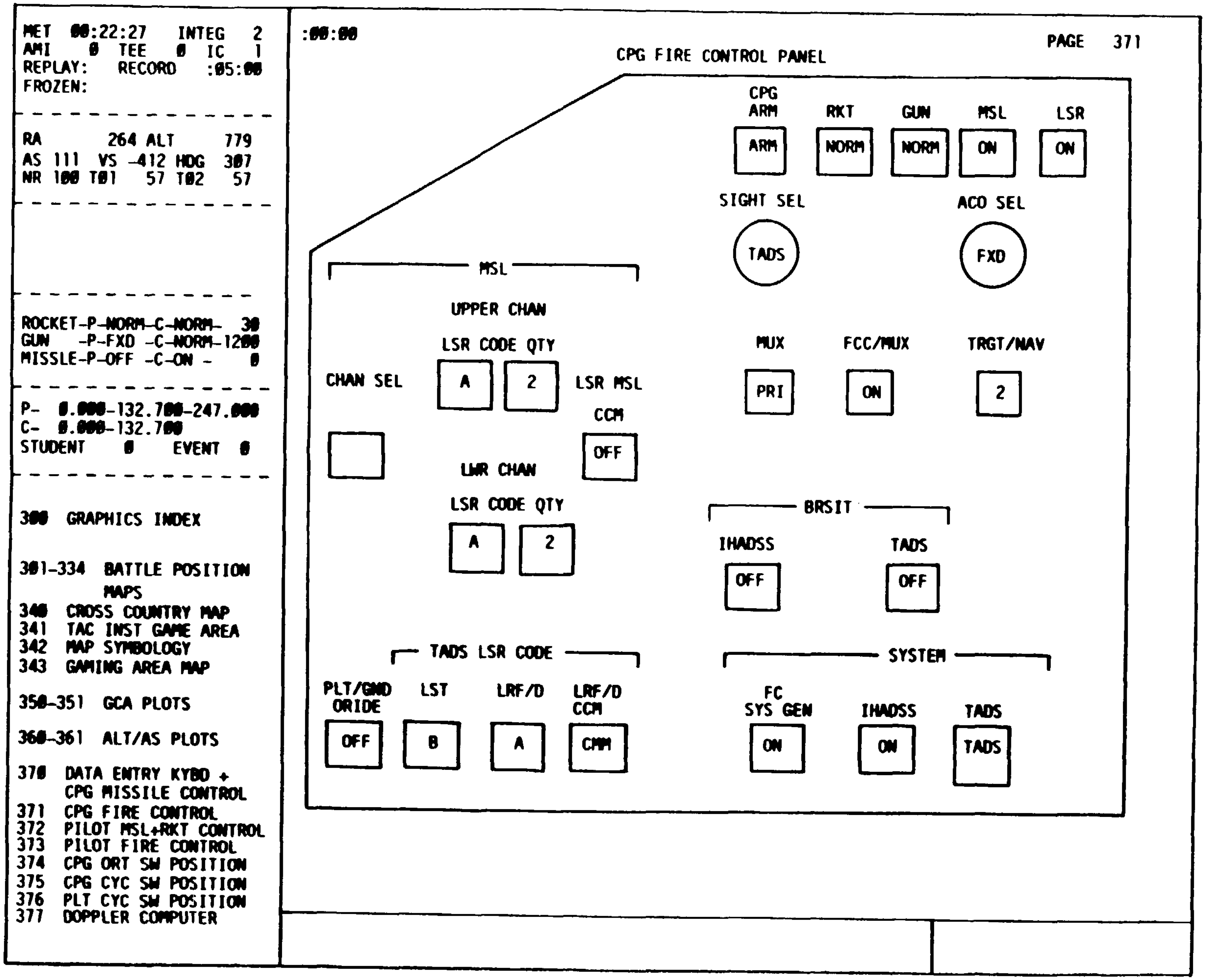

Figure 7-31. CPG Fire Control Panel Page Display

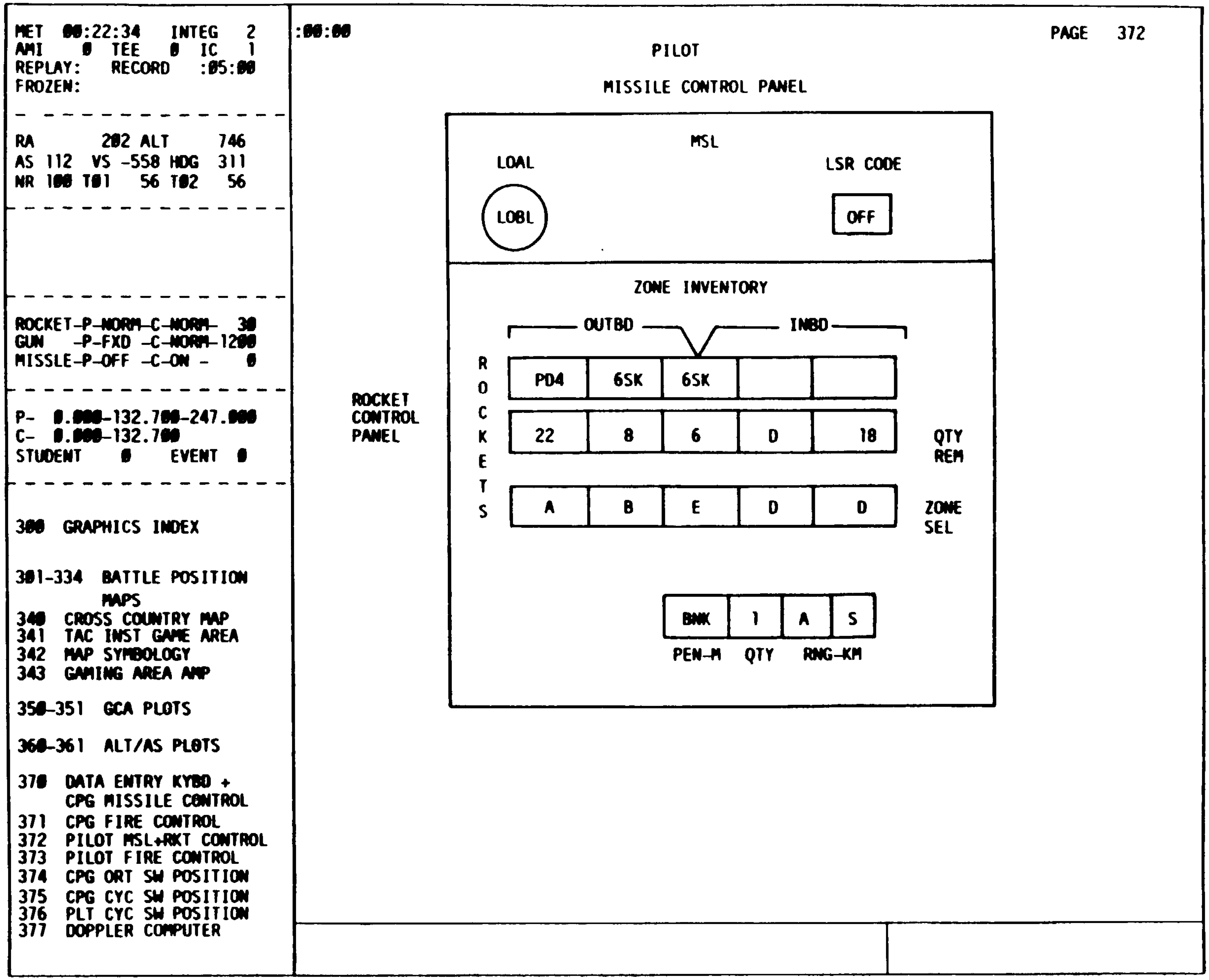

Figure 7-32. Pilot Missile Control Panel Page Display

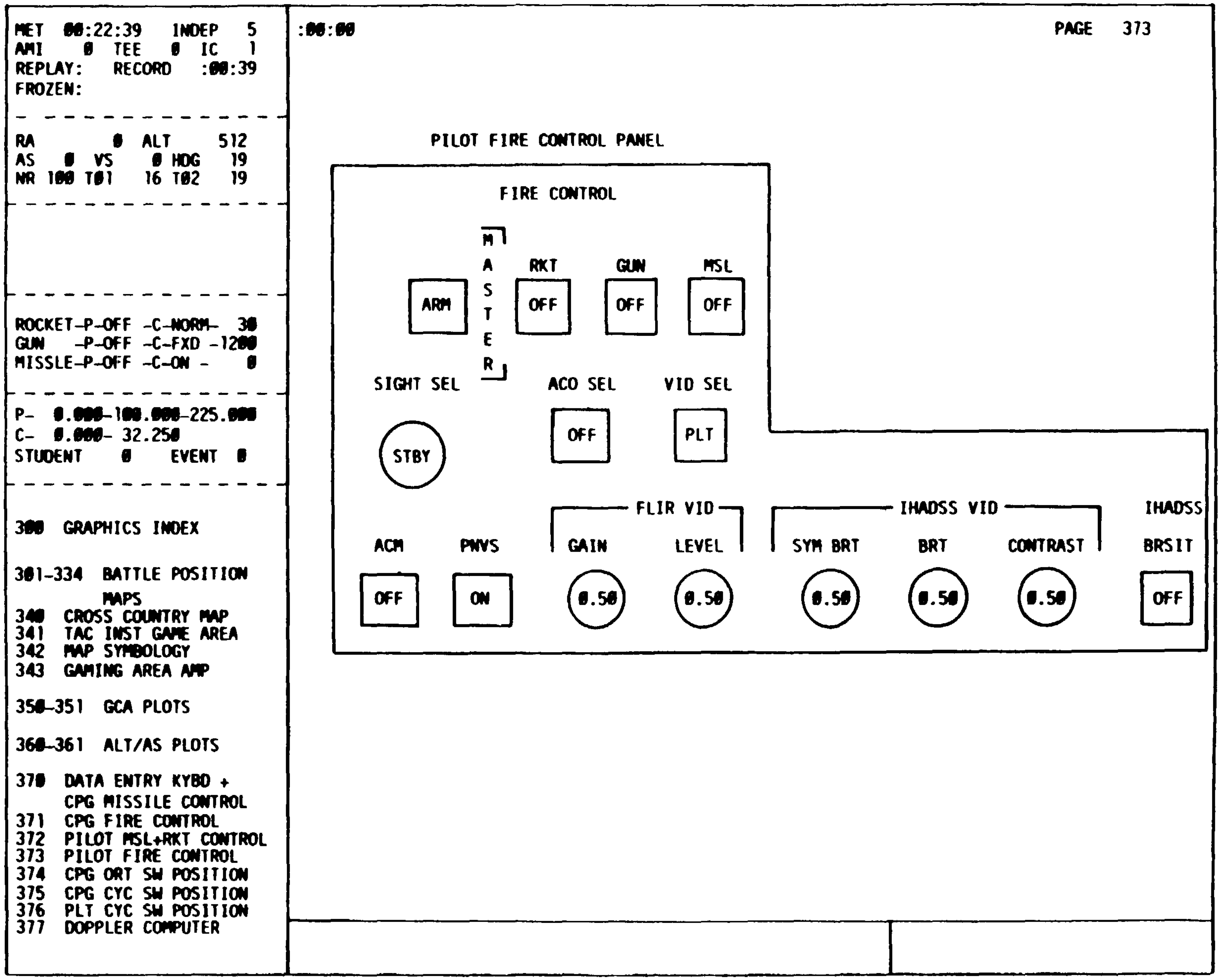

Figure 7-33. Pilot Fire Control Panel Page Display

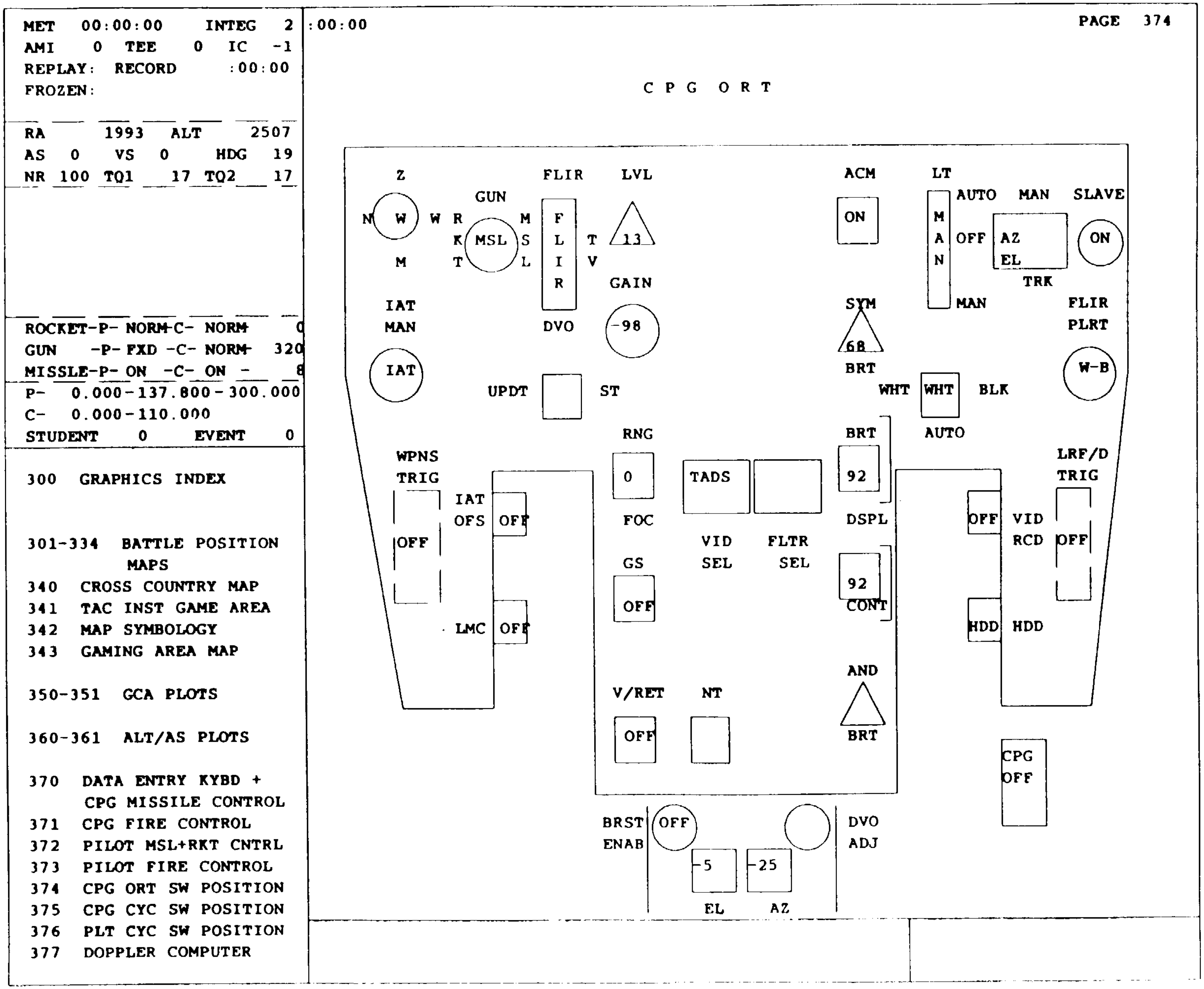

Figure 7-34. CPG ORT Page Display

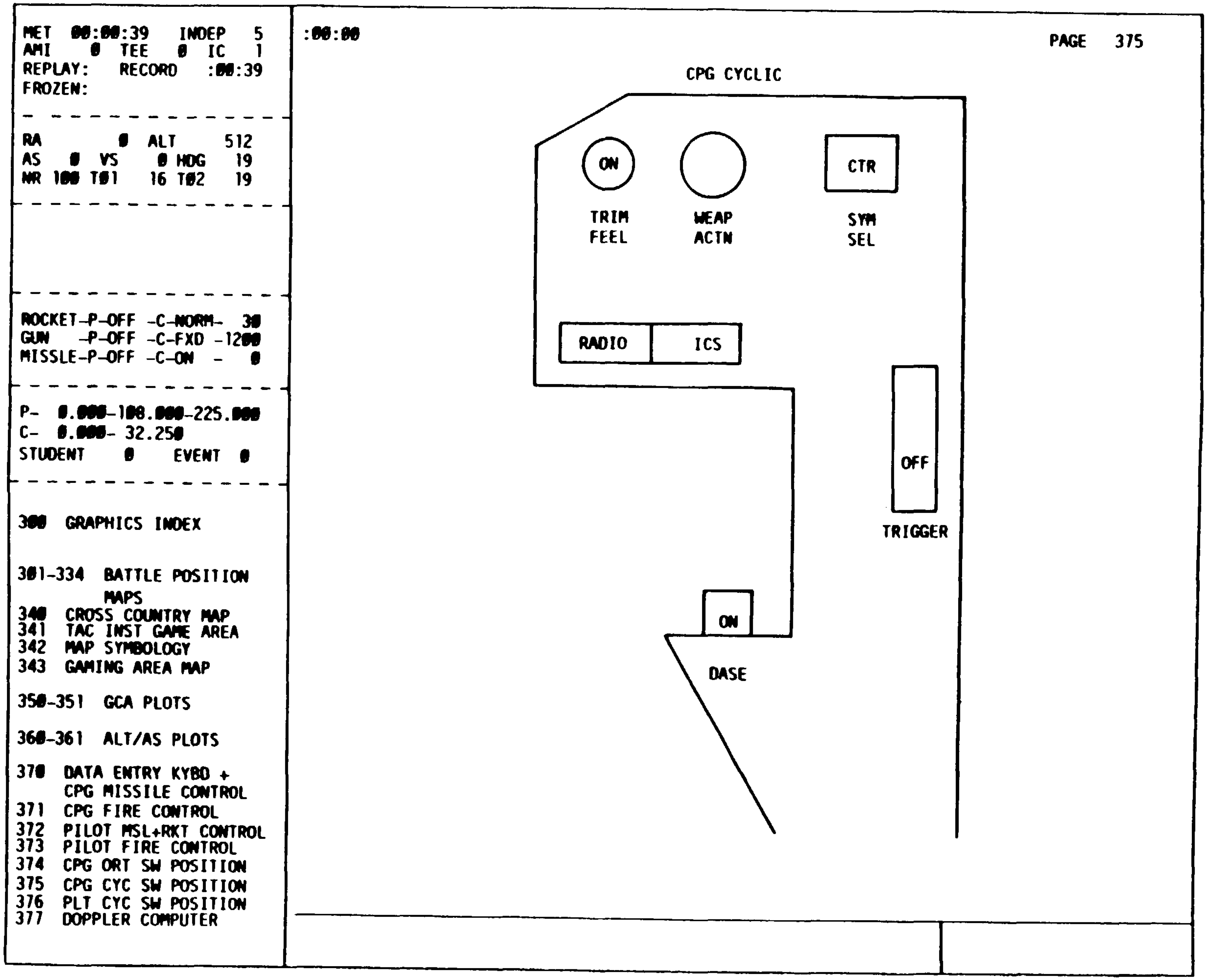

Figure 7-35. CPG Cyclic Page Display

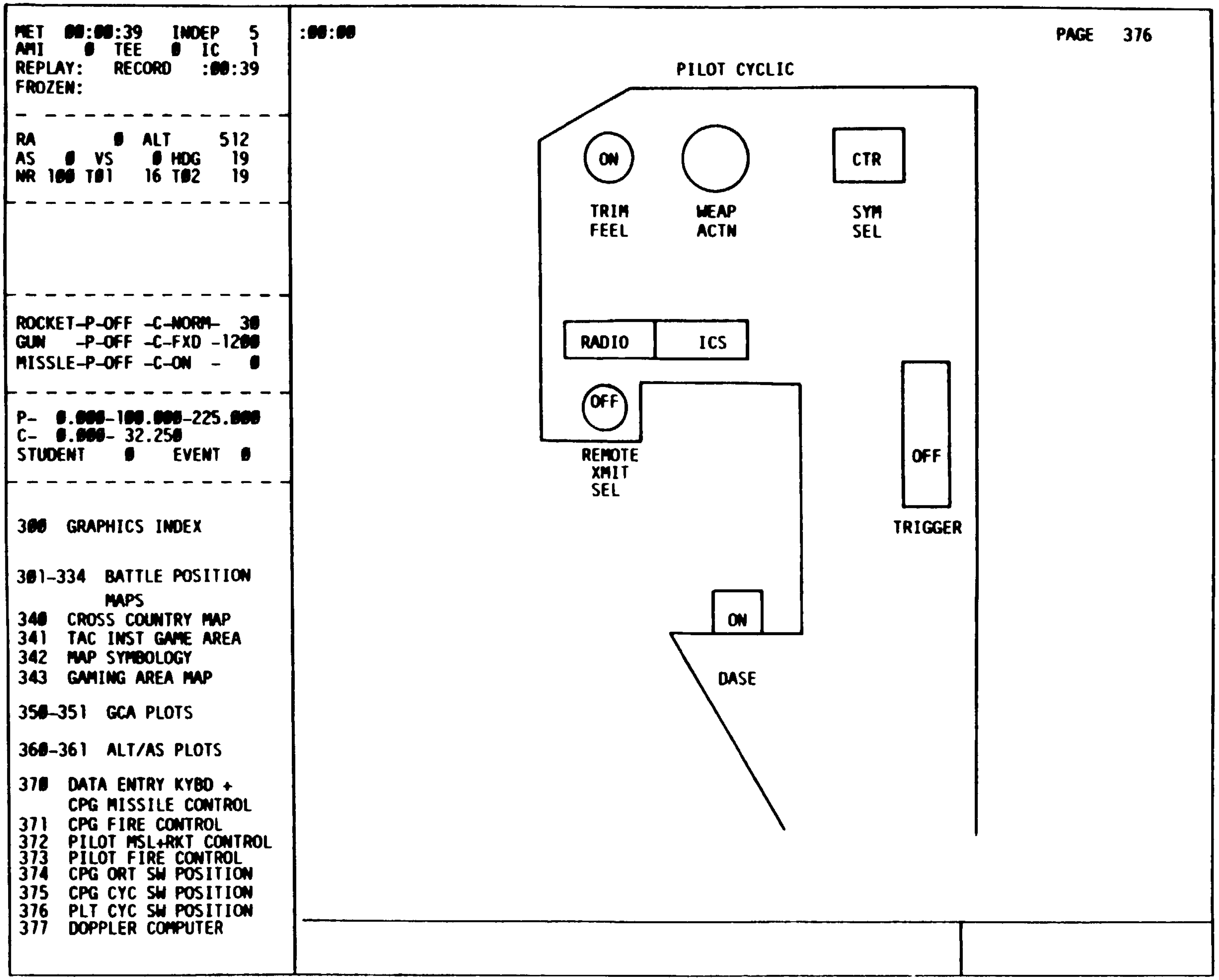

Figure 7-36. Pilot Cyclic Page Display

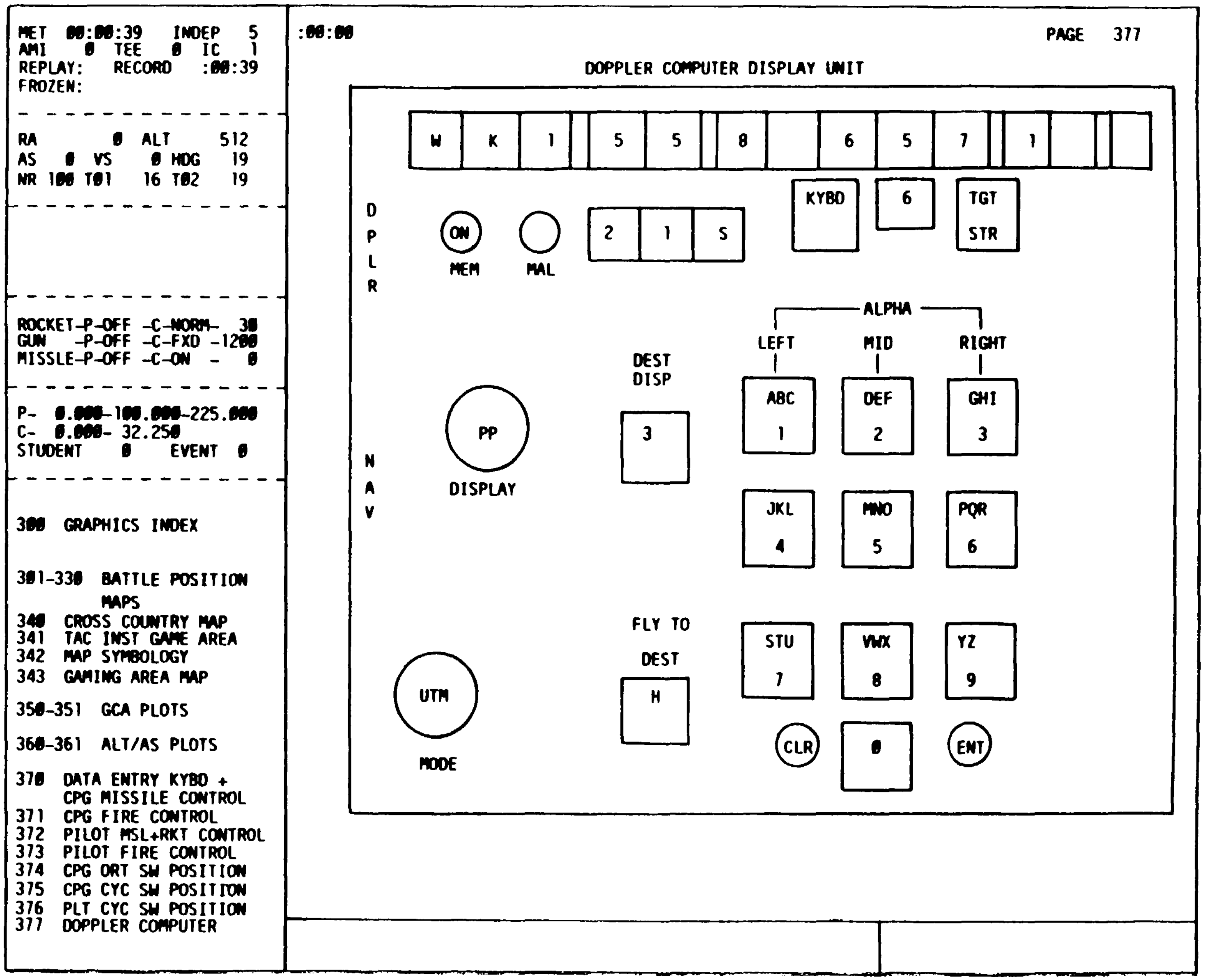

Figure 7-37. Doppler Computer Display Unit Page Display

b. These panel displays are updated continuously to indicate the changes that have occurred in the represented cockpit panel.

c. These panel displays permit the instructor to monitor switches, controls, and indicators in the trainee cockpits that might otherwise not be viewable; analyze trainee performance of procedures related to use of each panel; determine if panel switch, controls, and indicators are correct; and provide Doppler inputs to the pilot during independent mode operations.

7-39. TARGET ENGAGEMENT EXERCISE. The target engagement exercise (TEE) is a feature that automatically inserts events associated with the engagement of hostile targets in response to certain relationships between ownship and the target and trainees performance. The events include initiation of targets movement, targets firing at ownship, activation of hostile radar, weapons hits on ownship. and system malfunctions resulting from hits. The factors that trigger these events include altitude, line-of-sight exposure, range to target, and release of ownship weapons. Up to three of these triggering contingencies may be required to activate an event. When the specified insertion contingencies have been met, the target event occurs in the manner programmed for it without instructor intervention.

a. There are 20 preprogrammed TEE’s available for training. They are available to both the pilot and CPG instructors in the independent and the integrated modes. Each TEE can include up to ten targets. Five of the targets are capable of moving over predetermined routes. The other five are on fixed sites and do not travel. All targets capable of firing weapons can articulate and fire at the ownship. Weapons systems with radar are capable of electronic emissions that activate the radar warning receiver on the ownship. Aircraft survivability equipment (ASE) aboard the ownship is capable of foiling the respective type of weapons system.

b. All threat weapons systems are modeled after real-world weapons and perform accordingly. Preprogramned hostile events in a TEE are controlled via a sophisticated threat algorithm once the triggering contingencies have been met. For example, when intervisibility exists between the ownship and a hostile target and the ownship is within the effective range of the threat, the threat begins the acquisition process. If the threat is employing radar, it triggers the ownship radar warning receiver. If line-of-sight exposure is maintained, the threat engages the ownship. Hits on the ownship and resultant damage (malfunctions) are preprogrammed for each target in the TEE. Breaking line-of-sight (remasking) disrupts the threat acquisition process. Engagement and destruction of the threat also terminate the acquisition process.

c. Trainee (student) performance data is automatically stored during target engagements. This data is on CRT pages 595-596 and can be displayed at the IOS and retrieved in hardcopy. Additionally, data related to threat acquisition of the ownship is automatically recorded and can be displayed by calling up CRT page 594.

d. Preprogrammed TEE sets are indexed on CRT pages 500A and 500B. Individual TEE's are described in CRT pages 501 through 520. (See figure 7-38.) This page is addressed via the data entry keyboard on the console control panel. A TEE set can be reviewed on the CRT by keying in the 3-digit page number and depressing DISPL. The displayed TEE set provides all the data related to the targets for that set. This data includes target types, location, presence or absence of hostility, direction of travel, hits and associated malfunctions, and triggering contingencies applicable to each target. To enter a TEE set into the simulation, key in the

MET 00:00:00 INTEG 2
AMI 0 TEE 0 IC -1
REPLAY: RECORD :00:00
FROZEN:

RA 1993 ALT 2507
AS 0 VS 0 HDG 19
NR 100 TQ1 17 TQ2 17

ROCKET-P- NORM-C- NORM- 0
GUN -P- FXD -C- NORM- 320
MISSLE-P- ON -C- ON - 8
P- 0.000-137.800-300.000
C- 0.000-110.000
STUDENT 0 EVENT 0

500 TARGET INDEX

501-520 TEE SETS

530 TARGET STATUS
531 TARGET TYPE LIST
532-535 TARGET SITE LIST
540 TGT SITE OVERVW
541-574 BAT POS TGT SITE

580 TARGET CONTROL
581 VISIONICS POINT-ING/REMOTE DESIG
582 REMOTE DESIG
583 TARGET EVAL

590 WEAPONS LOADING
591 ROCKET CONFIG
592 FARP CONTROL
593 THRT SCRNG GRPH
594 THREAT SCORING
595-596 OWNSHP ENGA PRFM
597 OWNSHP WPN SCRNG

:00:00 PAGE 501

TARGET ENGAGEMENT EXERCISE

SET NO. 1

ITEM	TARGET		HOS	ACT	M-H	IR	MOTION	PATHWAY	SPEED
02	ZSU-23-4	AT SITE	9	OFF	0	HOT	OFF	1	10
03	T-80	AT SITE	9	OFF	0	HOT	OFF	2	10
04	T-62	AT SITE	9	OFF	0	HOT	OFF	3	10
05	MI-24	AT SITE	9	OFF	0	HOT	OFF	4	50
06	SA-6	AT SITE	9	OFF	0	HOT	OFF	5	10
07	BMP	AT SITE	26	ON	0	HOT	OFF		
08	SA-9	AT SITE	25	OFF	0	COLD	OFF		
09	LT TRUCK	AT SITE	33	OFF	0	HOT	OFF		
10	M-1	AT SITE	34	OFF	0	HOT	OFF		
11	HV TRUCK	AT SITE	35	OFF	0	HOT	OFF		

ITEM ITEM ITEM

ITEM ITEM ITEM

ITEM ITEM ITEM

ITEM ITEM ITEM

ITEM ITEM ITEM

Figure 7-38. Target Engagement Exercise Page Display

3-digit page number via the keyboard and depress ENTER. The TEE set is now available. When the triggering contingencies are met, the set activates, only one TEE set can be entered into simulation at a time. The simulator need not be in freeze to enter TEE sets. Entering an additional TEE set during training automatically deletes the previously entered set.

e. After a TEE has been entered, various aspects of it can be reviewed by displaying other pages related to targets. Target status CRT page 530 summarizes targets and their related activity. Target site overview CRT page 540 graphically depicts all 99 target sites and indicates, with symbols, which sites have been selected with the current TEE. A target site detailed display, which provides a specific target site and the routes of travel from the site, can be called up by using the index and control area on CRT page 540. Detailed firing position sites that graphically depict threat targets visible from that specific firing position are on CRT pages 541 through 575.

f. Student/trainee engagement performance data are summaries of engagement activity and are on CRT pages 595-596.

g. Threat acquisition data are summaries of hostile weapons activity and are on CRT page 594.

h. TEE sets are used to:

Permit preprogramming threat activities to establish a hostile environment
Reduce instructor workload
Provide a greater degree of standardization in the presentation of threat situations
Permit an increased degree of control over the content of training
Permit rapid rearrangement of threat activity
Permit expansion of the battlefield environment and flexibility in structuring training scenarios

7-40. TARGET STATUS. The target status page provides status information for targets that are currently entered in the simulation. (Table 7-9 defines the data elements displayed on the page.)

a. Characteristics of the target status page (figure 7-39) include a summary of the most recently activated TEE or manually inserted targets, and a depiction of up to 10 targets (ten is the maximum number of active targets).

b. The target status page is in group 5 (TARGETS) and can be accessed via the data entry keyboard by calling up CRT page 530.

c. The target status page is used to determine:

Number and type of active targets
Site location of active targets
Which targets are hostile and which malfunctions are associated with a hit
Which targets will move and their path and speed
IR signature type for each target

Table 7-9. Target Status Information

Item	Data
TARGET REFERENCE #	Number of selected target.
TARGET TYPE #	Number from target type list.
TARGET SITE #	Number of site that target is located on.
HOSTILE ACTIVITY	ON/OFF; if ON, hostile activity includes electronic missions (radar) and threat weapons firing at ownship.
HIT CODE	When hits on ownship are enabled, the 5-digit malfunction number associated with the hit is displayed.
INFRA RED	HOT/COLD.
MOTION	ON/OFF; when ON, target travels over a predetermined path.
PATHWAY	Number of pathway that target will travel from target site. (Refer to TARGET SITE PATHWAY detailed display.)
SPEED	Ground target speed from 10 to 40 kph in 10-kph increments is displayed; speed for helicopter targets is up to 200 kph.

7-41. TARGET TYPES LIST. The target types list page (figure 7-40) is a list of available targets and depicts the name, type number, and whether it has a radar or weapons system available. These targets can be placed on the target sites available in the visual gaming area. Targets are selected and placed via the TEE's or manually via the target control page. The list includes 44 different vehicles.

a. The target types list page is in group 5 (TARGETS) and can be accessed via the data entry keyboard by calling up CRT page 531 and using page forward or page back to access 531B and 531C. The target TYPE # on CRT page 531A-C is the same reference number that is depicted on the target status page, and is the number to be used when designating target type for TEE's and the target control page. Each target type that appears in the computer-generated visual scene is shown in figure 7-41. The graphic illustrations are shown in the same level of detail as would be seen close up or through sensor magnification.

NOTE

The SA-4 appears as an SA-6, and the FLATWHEEL radar appears as a KRAZ-255B truck. However, it is not difficult to discriminate between the simulated electronic emissions. The I-HAWK can only be placed on fixed target sites.

MET 00:00:00 INTEG 2
AMI 0 TEE 0 IC -1
REPLAY: RECORD :00:00
FROZEN:

RA 1993 ALT 2507
AS 0 VS 0 HDG 19
NR 100 TQ1 17 TQ2 17

ROCKET-P- NORM-C- NORM 0
GUN -P- FXD -C- NORM 320
MISSLE-P- ON -C- ON - 8
P- 0.000-137.800-300.000
C- 0.000-110.000
STUDENT 0 EVENT 0

500 TARGET INDEX

501-520 TEE SETS

530 TARGET STATUS
531 TARGET TYPE LIST
532-535 TARGET SITE LIST
540 TGT SITE OVERVW
541-574 BAT POS TGT SITE

580 TARGET CONTROL
581 VISIONICS POINT-ING/REMOTE DESIG
582 REMOTE DESIG
583 TARGET EVAL

590 WEAPONS LOADING
591 ROCKET CONFIG
592 FARP CONTROL
593 THRT SCRNG GRPH
594 THREAT SCORING
595-596 OWNSHP ENGA PRFM
597 OWNSHP WPN SCRNG

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TARGET STATUS

TARGET REFERENCE #	TARGET TYPE #	TARGET SITE #	HOSTILE ACTIVITY	M-H CODE	INFRA RED	MOTION	PATHWAY	SPEED
1	0	0	NO	0	COLD	OFF	0	0
2	0	0	NO	0	COLD	OFF	0	0
3	0	0	NO	0	COLD	OFF	0	0
4	0	0	NO	0	COLD	OFF	0	0
5	0	0	NO	0	COLD	OFF	0	0
6	0	0	NO	0	COLD	OFF	0	0
7	0	0	NO	0	COLD	OFF	0	0
8	0	0	NO	0	COLD	OFF	0	0
9	0	0	NO	0	COLD	OFF	0	0
10	0	0	NO	0	COLD	OFF	0	0

Figure 7-39. Target Status Page Display

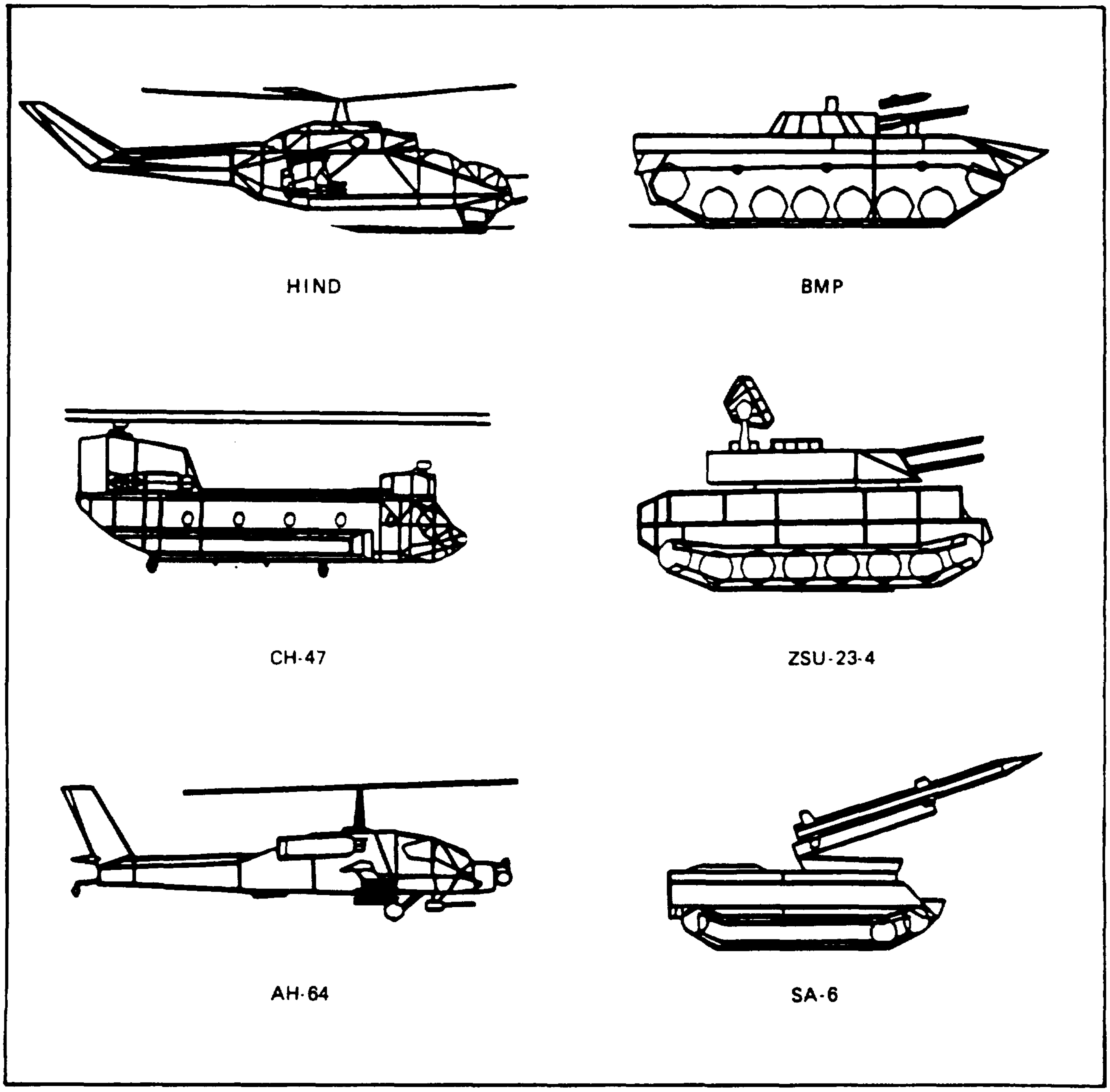
```
MET   00:00:00    INTEG  2
AMI    0  TEE   0  IC   -1
REPLAY:  RECORD      :00:00
FROZEN:

RA        1993  ALT     2507
AS   0    VS   0     HDG  19
NR  100  TQ1    17  TQ2   17

ROCKET-P- NORM-C- NORM     0
GUN    -P- FXD -C- NORM- 320
MISSLE-P- ON  -C- ON  -    8
P-   0.000-137.800-300.000
C-   0.000-110.000
STUDENT     0     EVENT    0

500      TARGET INDEX

501-520 TEE SETS

530      TARGET STATUS
531      TARGET TYPE LIST
532-535 TARGET SITE LIST
540      TGT SITE OVERVW
541-574 BAT POS TGT SITE

580      TARGET CONTROL
581      VISIONICS POINT-
          ING/REMOTE DESIG
582      REMOTE DESIG
583      TARGET EVAL

590      WEAPONS LOADING
591      ROCKET CONFIG
592      FARP CONTROL
593      THRT SCRNG GRPH
594      THREAT SCORING
595-596 OWNSHP ENGA PRFM
597      OWNSHP WPN SCRNG
```

:00:00 PAGE 531A

TARGET TYPES LIST

TYPE #	RADAR	NAME	WEAPONS	MAX AVAIL
1	NO	T-80	YES	10
2	NO	M-1	YES	10
3	NO	T-62	YES	10
4	YES	SA-4	YES	10
5	YES	ZSU-23-4	YES	10
6	YES	SA-6	YES	10
7	NO	SA-8 OPTICAL	YES	10
8	YES	SA-8 RADAR	YES	10
9	NO	SA-9	YES	10
10	YES	FLAPWHEEL	NO	10
11	NO	HEAVY TRUCK	NO	10
12	NO	LIGHT TRUCK	NO	10
13	NO	BMP-1	YES	10
14	NO	BTR-60PA	NO	10
15	NO	MI-2	NO	10
16	NO	MI-24D	NO	10

Figure 7-40. Target Types List Page Display



15535

Figure 7-41. Visual Gaming Weapons Symbols (Sheet 1)

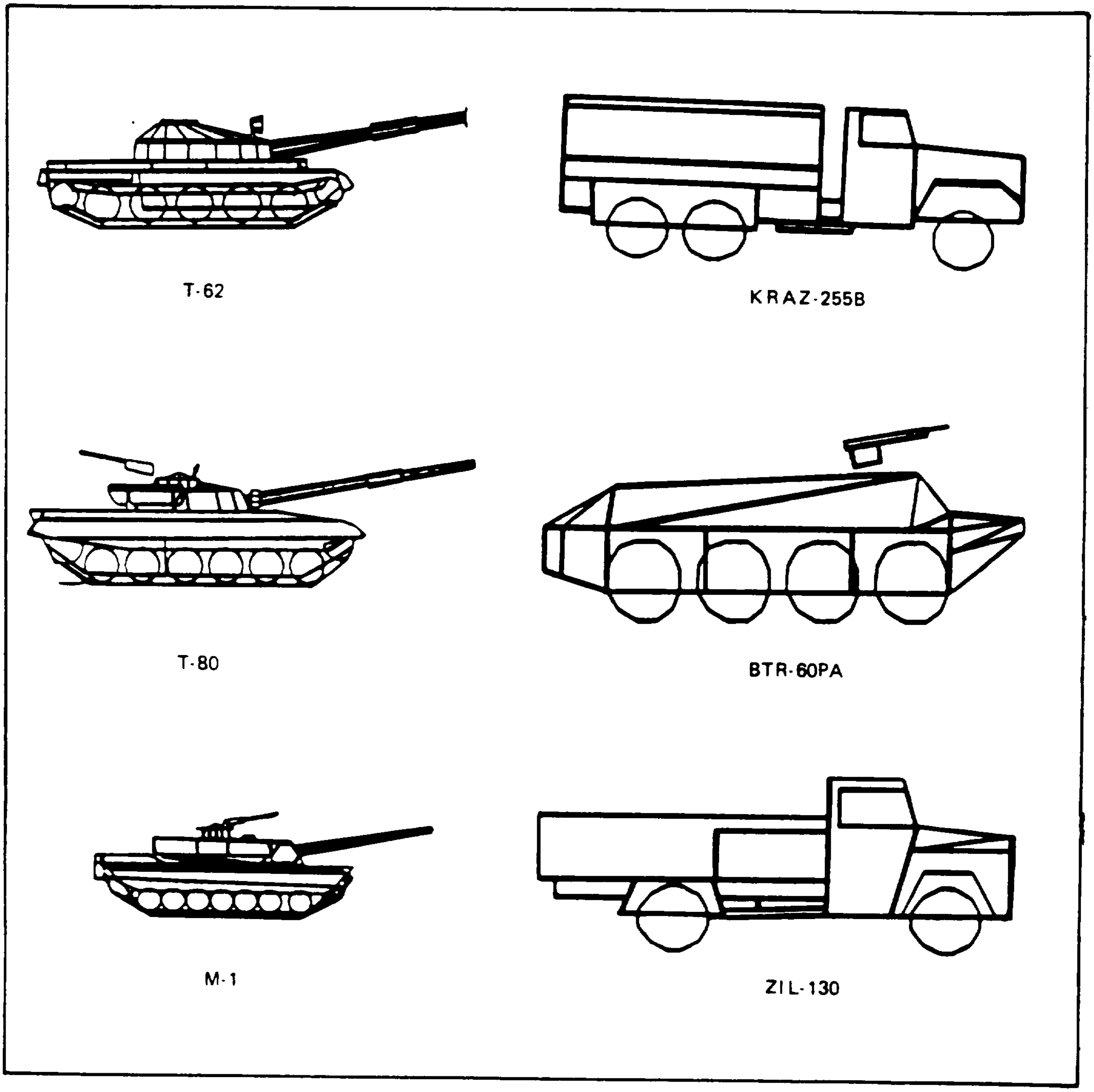


Figure 7-41. Visual Gaming Weapons Symbols (Sheet 2)

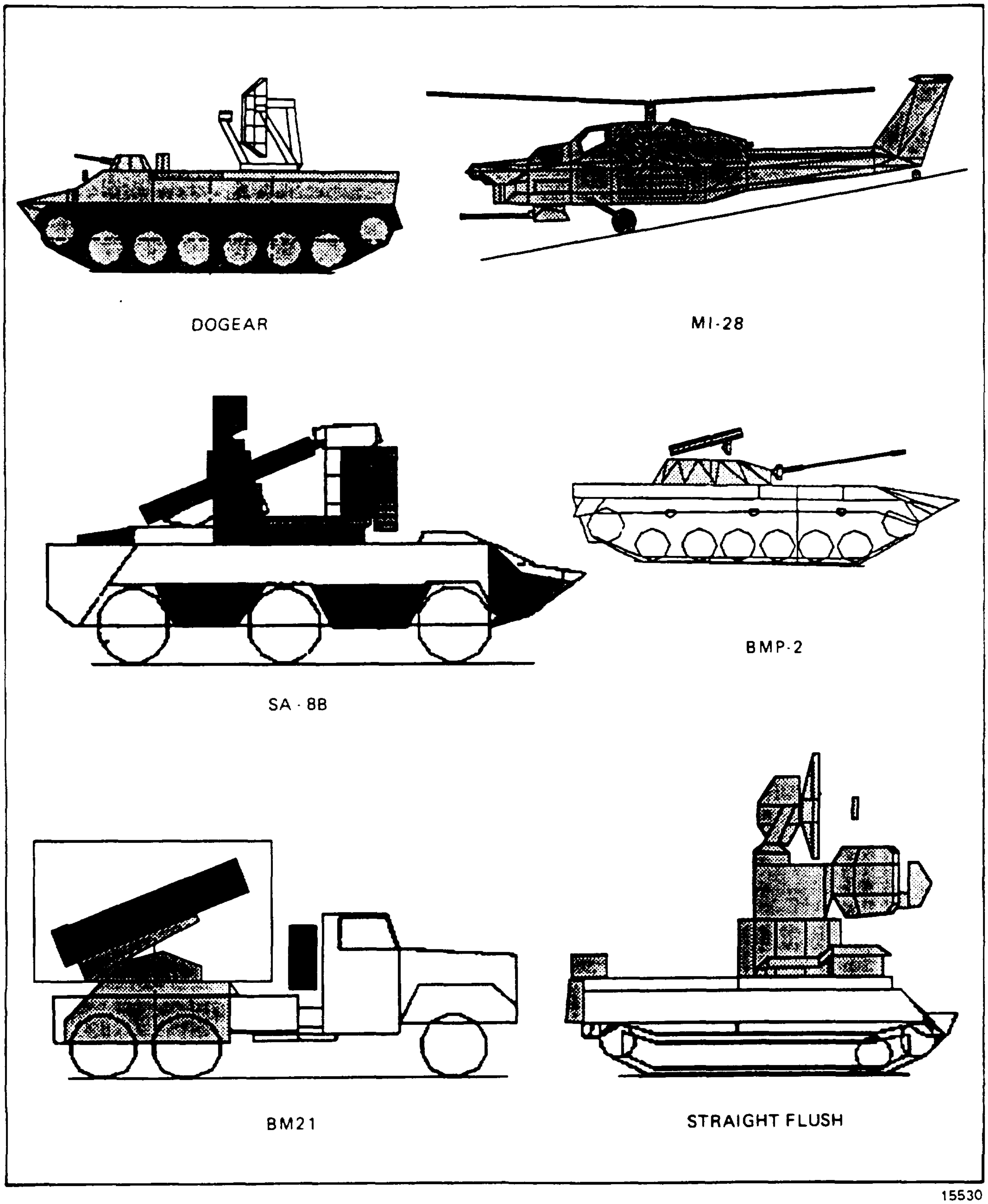


Figure 7-41. Visual Gaming Weapons Symbols (Sheet 3)

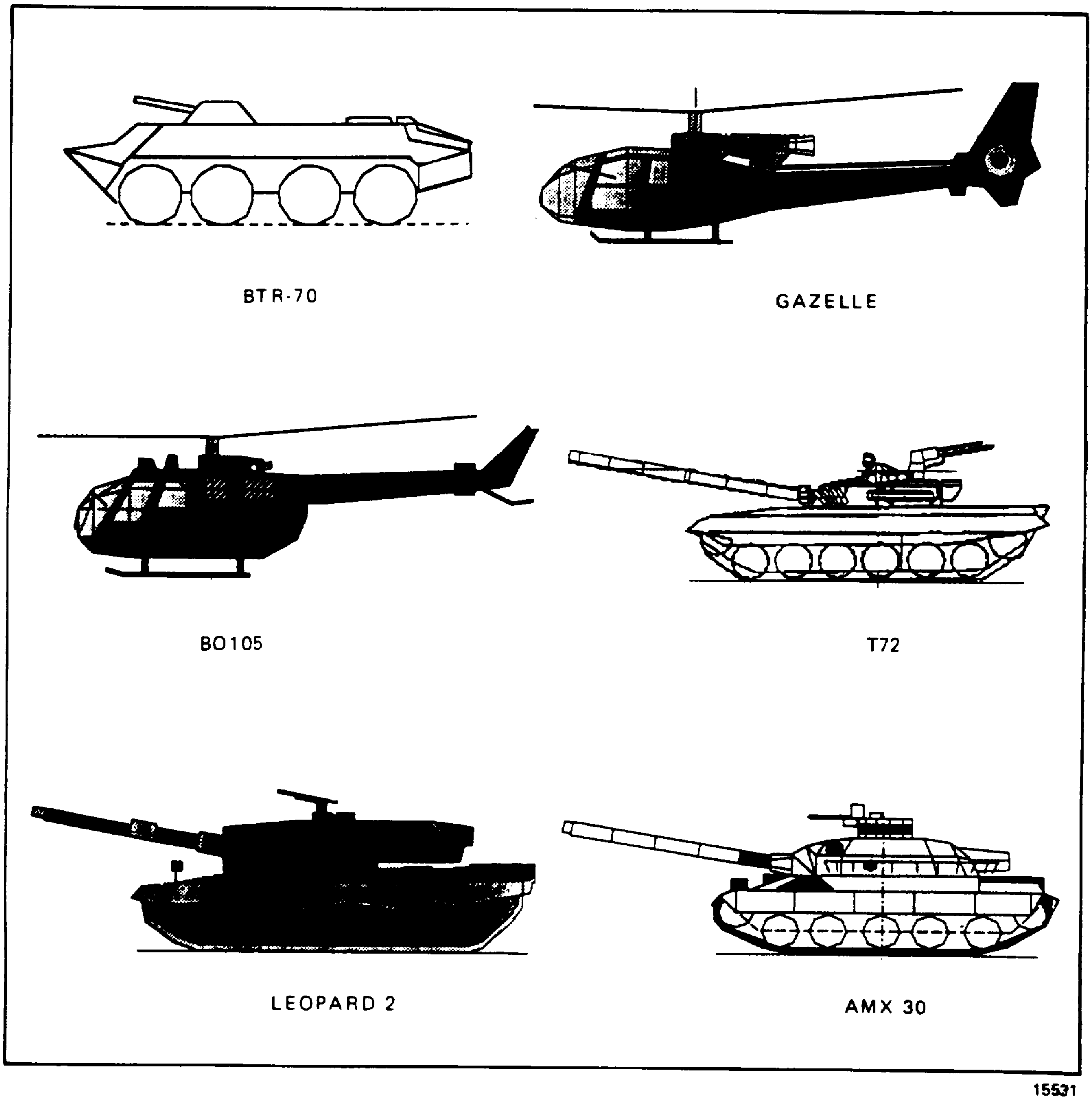


Figure 7-41. Visual Gaming Weapons Symbols (Sheet 4)

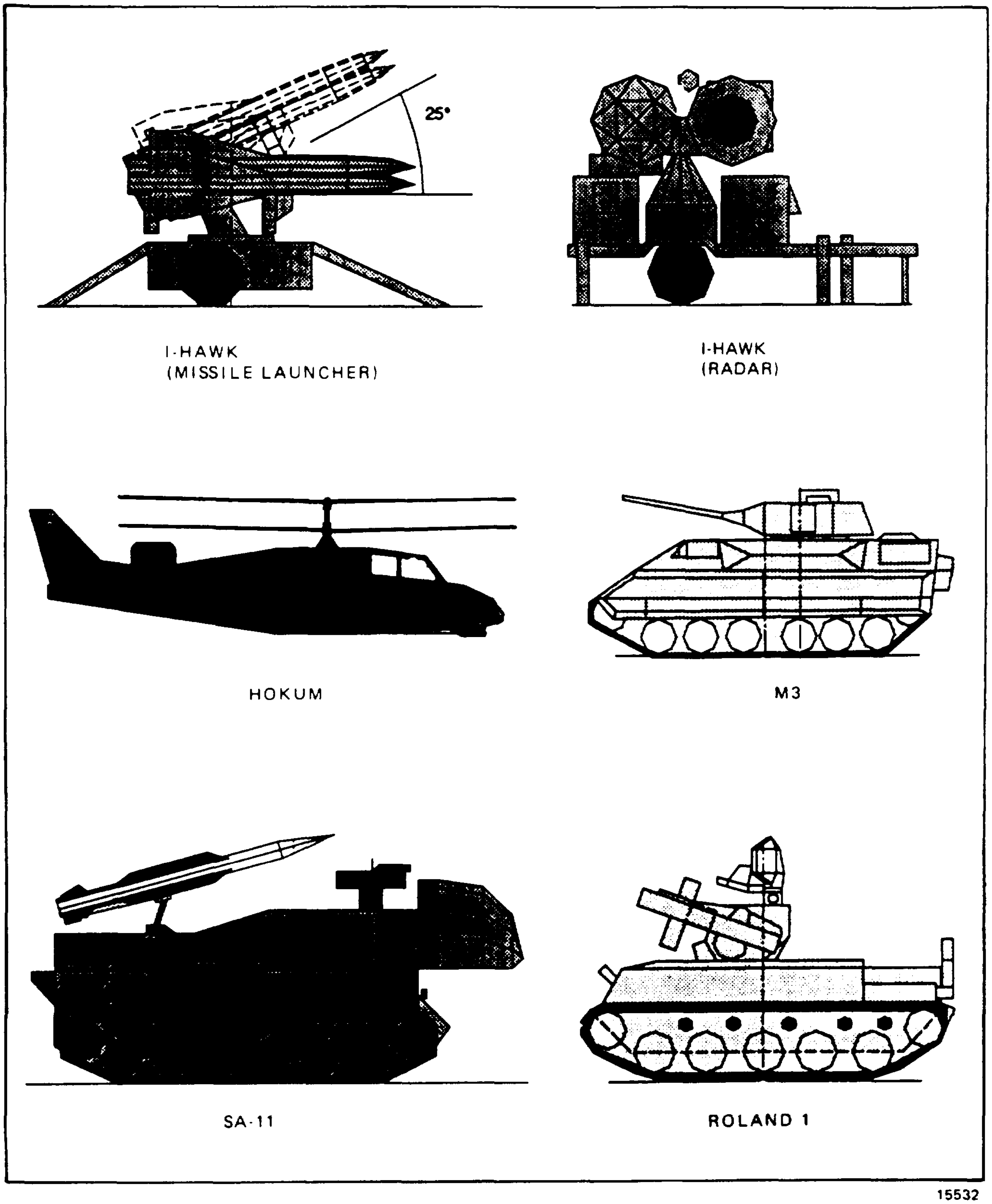


Figure 7-41. Visual Gaming Weapons Symbols (Sheet 5)

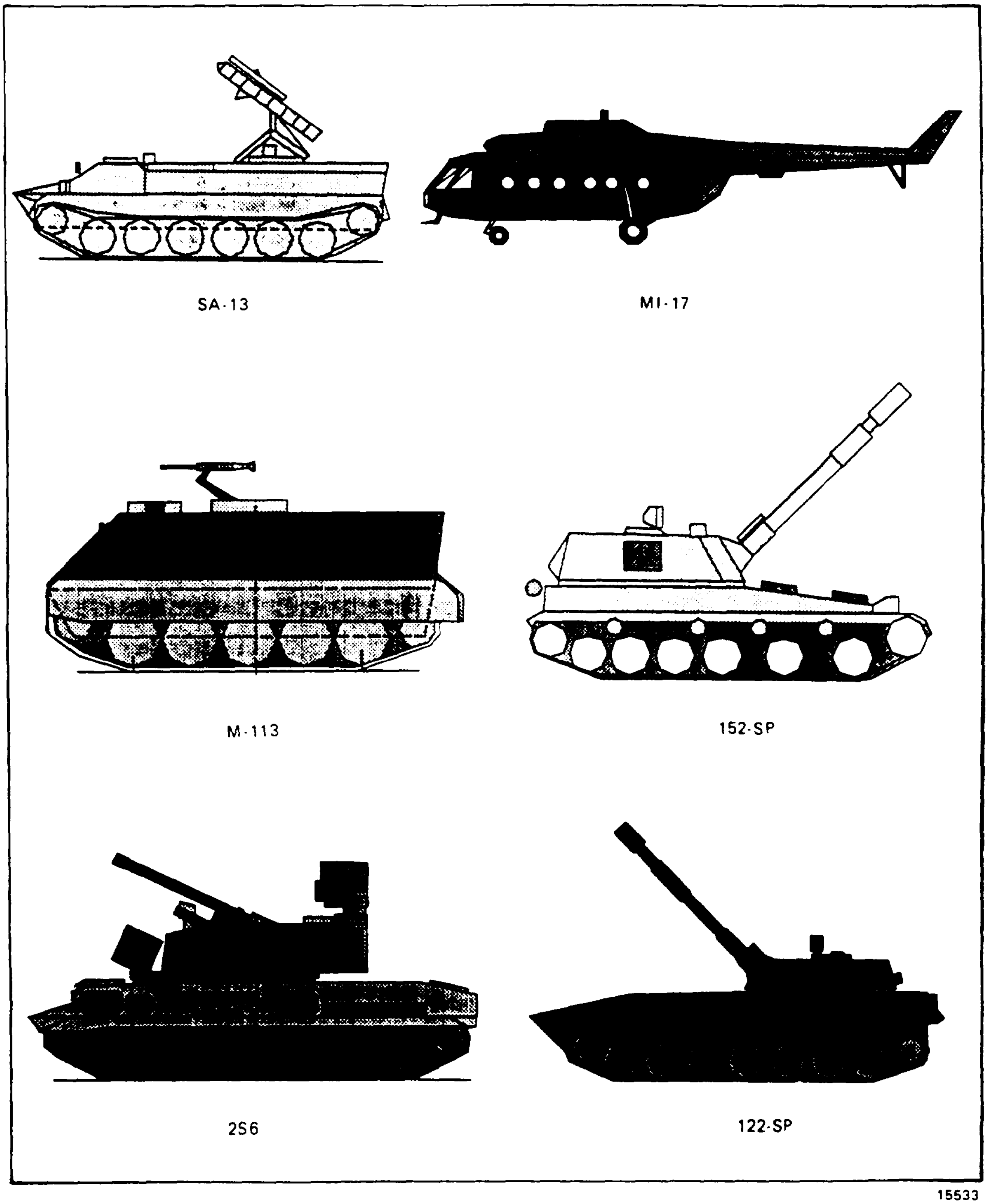


Figure 7-41. Visual Gaming Weapons Symbols (Sheet 6)

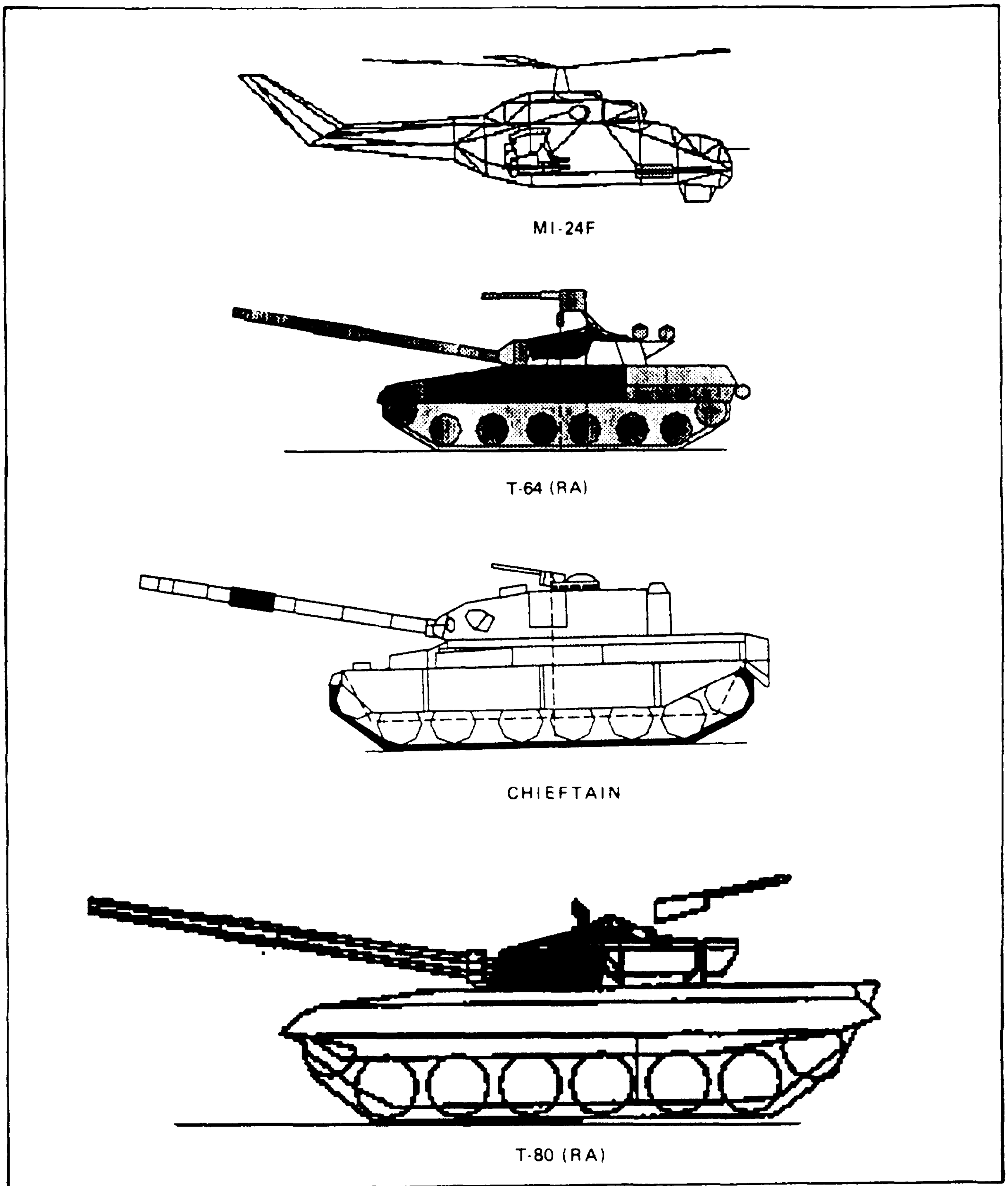


Figure 7-41. Visual Gaming Weapons Symbols (Sheet 7)

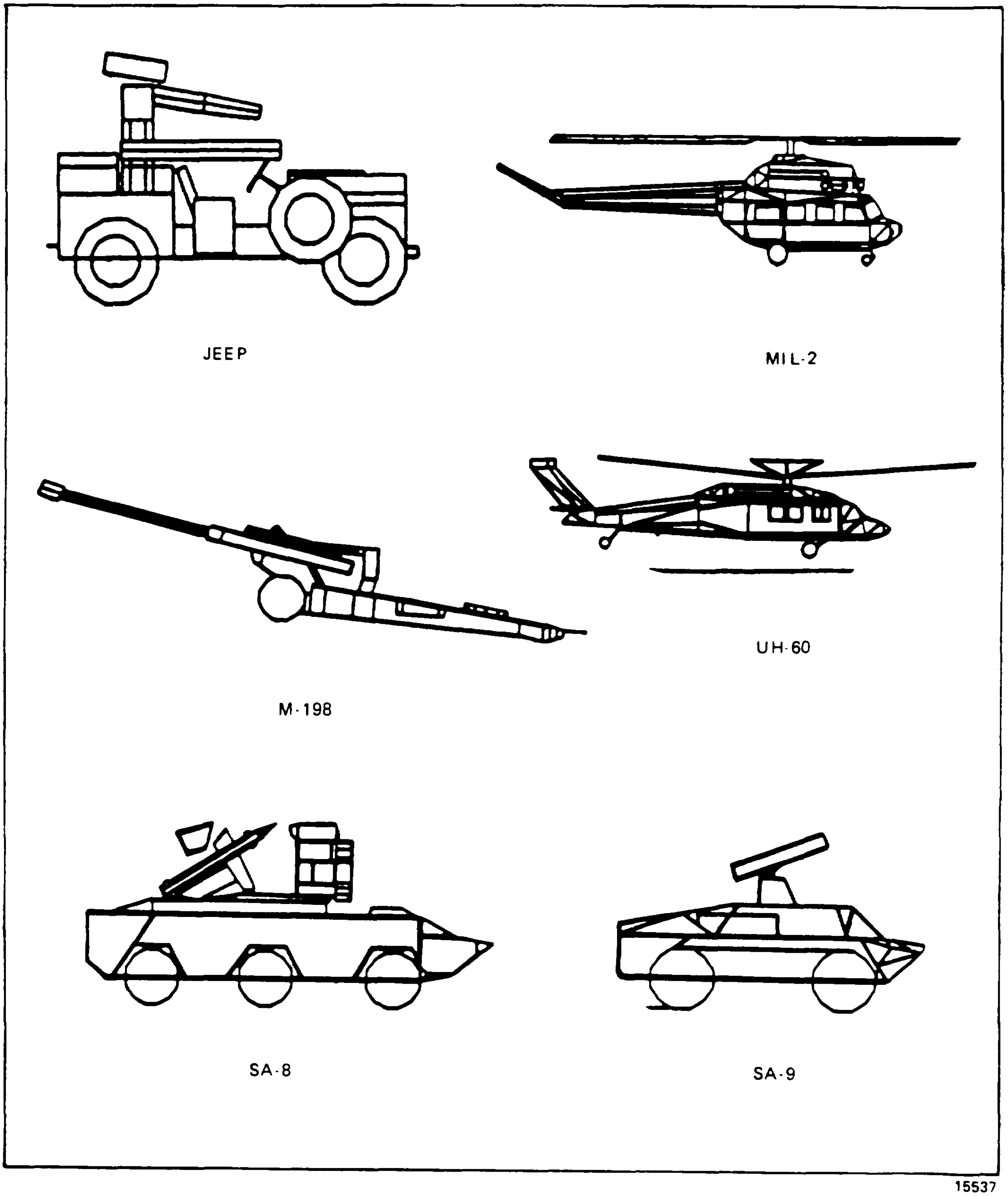


Figure 7-41. Visual Gaming Weapons Symbols (Sheet 8)

b. The target types list page is used to identify the types of available targets. to select and enter targets into the simulation, and to determine whether a target type has radar and/or weapons.

7-42. TARGET SITES LIST. The target sites list page (figure 7-42) is an information list for the 99 target sites In the visual gaming area. The list provides the site name, site number, and site position in UTM coordinates. The site number is the reference number used to designate a site when preparing TEE's or when using the manually inserted targets via the target control page.

a. The first 20 target sites (01 through 20) have been designated as moving target sites (e.g., sites that have specific, preprogrammed ground or airborne pathways that targets will follow when notion is enabled and activated). Fifteen of these roving target sites are ground sites (1 through 15) that can accommodate up to five targets each. The targets move on separately numbered paths (1 through 5) and generally follow the same route for approximately 15 kilometers. The remaining five moving target sites (16 through 20) have been designed for use with aircraft. The airborne sites each have a single flightpath. The aircraft maintains a fixed altitude (MSL) throughout the route of flight. Hostile aircraft on any moving target site have a hostile capability. If ownship enters designed firing cone (approximately ±20° from the threat aircraft CL out to maximum weapon range) hostile helicopters will engage ownship until cone limits are exceeded.

b. The remaining 79 sites (21 through 99) are fixed target sites. These sites have no pathways, and targets do not travel when positioned on them. When targets are positioned at fixed sites, they can be designated as hostile; in that case, both radar and weapons are directed against the ownship when hostile activities are selected. Ground systems rotate and point toward the ownship prior to firing. Hostile aircraft on fixed sites (excluding MI-24D, F) will come to 25 foot hover, turn, and engage ownship until LOS is broken. The TEE and the manual target control page are used to establish the initial criteria for hostile threat activity and ownship hits. These criteria are evaluated in a threat algorithm (refer to THREAT WEAPONS SCORING) to determine the outcome of the threat activity.

c. The target sites list page is in group 5 (TARGETS) and can be accessed via the data entry keyboard by calling up CRT pages 532 through 535. The CRT page is used to determine target sites names and positions/locations (UTM coordinates), moving target sites, and airborne target sites.

7-43. TARGET SITES OVERVIEW. The target sites page (figures 7-43 and 7-44) is a graphic picture of the simulated visual gaming area indicating each target site location by number within a 40- by 32-km area. When a target has been selected and positioned on a target site. either manually or via activation of a TEE, a symbol appears on the target site overview identifying the specific type of target. Figure 7-45 shows the symbols used to identify the different targets from the target list. Figure 7-45 also shows symbols used for FARP's, NDB's, GCA's, ownship, malfunctions, and 3-minute index marks. In addition to appearing on the target site overview display, these symbols also appear on other graphic CRT pages (e.g.. cross-country raps, battle position target site maps, etc.).

a. The target site overview page (figure 7-43) is in group 5 (TARGETS) and can be accessed via the data entry keyboard and keying in 540 DISPL.

MET	00:00:00	INTEG	2	
AMI	0	TEE	0	IC -1
REPLAY:	RECORD	:00:00		
FROZEN:				

RA 1993 ALT 2507
AS 0 VS 0 HDG 19
NR 100 TQ1 17 TQ2 17

ROCKET-P- NORM-C- NORM 0
GUN -P- FXD -C- NORM 320
MISSLE-P- ON -C- ON - 8
P- 0.000-137.800-300.000
C- 0.000-110.000
STUDENT 0 EVENT 0

500	TARGET INDEX
501-520	TEE SETS
530	TARGET STATUS
531	TARGET TYPE LIST
532-535	TARGET SITE LIST
540	TGT SITE OVERVW
541-574	BAT POS TGT SITE
580	TARGET CONTROL
581	VISIONICS POINT-ING/REMOTE DESIG
582	REMOTE DESIG
583	TARGET EVAL
590	WEAPONS LOADING
591	ROCKET CONFIG
592	FARP CONTROL
593	THRT SCRNG GRPH
594	THREAT SCORING
595-596	OWNSHP ENGA PRFM
597	OWNSHP WPN SCRNG

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TARGET SITES LIST (MOVING)

SITE #	POSITION	PATHS	TARGET TYPE
1	21SVK89466217	1-5	ALL
2	21SVK90527356	1-5	ALL
3	21SVK90338037	1-5	ALL
4	21SVK81697350	1-5	ALL
5	21SVK81275413	1-5	ALL
6	21SVK81297045	1-5	ALL
7	21SVK84657959	1-5	ALL
8	21SVK82206463	1-5	ALL
9	21SVK90635546	1-5	ALL
10	21SWK06345814	1-5	ALL
11	21SWK06176473	1-5	ALL
12	21SWK06216744	1-5	ALL
13	21SVK96597757	1-5	ALL
14	21SWK00396856	1-5	ALL
15	21SWK01396950	1-5	ALL
16	21SVK80705470	7	AIR ONLY
17	21SWK06505131	7	AIR ONLY
18	21SVK94318061	7	AIR ONLY
19	21SVK81505131	7	AIR ONLY
20	21SVK89698070	7	AIR ONLY

NOTE: TARGET SITES 1-15, AIR TARGETS FLY AT 50 FT AGL, MAXIMUM SPEED 40 KM/HR.

TARGET SITES 16-20, AIR TARGETS FLY AT MAXIMUM SPEED 200 KM/HR.

(PAGE FORWARD FOR CONTINUATION)

Figure 7-42. Target Sites List Page Display (Sheet 1)

MET 00:00:00 INTEG 2
AMI 0 TEE 0 IC -1
REPLAY: RECORD :00:00
FROZEN:

RA 1993 ALT 2507
AS 0 VS 0 HDG 19
NR 100 TQ1 17 TQ2 17

ROCKET-P- NORM-C- NORM 0
GUN -P- FXD -C- NORM 320
MISSLE-P- ON -C- ON - 8
P- 0.000-137.800-300.000
C- 0.000-110.000
STUDENT 0 EVENT 0

500 TARGET INDEX

501-520 TEE SETS

530 TARGET STATUS
531 TARGET TYPE LIST
532-535 TARGET SITE LIST
540 TGT SITE OVERVW
541-574 BAT POS TGT SITE

580 TARGET CONTROL
581 VISIONICS POINTING/REMOTE DESIG
582 REMOTE DESIG
583 TARGET EVAL

590 WEAPONS LOADING
591 ROCKET CONFIG
592 FARP CONTROL
593 THRT SCRNG GRPH
594 THREAT SCORING
595-596 OWNSHP ENGA PRFM
597 OWNSHP WPN SCRNG

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TARGET SITES LIST (STATIONARY)

SITE #	POSITION	HEADING (MAG)	ALTITUDE (FT MSL)
21	21SVK81585327	19	512
22	21SVK82255466	19	523
23	21SVK86515554	109	524
24	21SVK86555512	109	516
25	21SVK94495582	129	512
26	21SVK94365517	88	513
27	21SWK00495589	123	513
28	21SWK00635553	120	519
29	21SWK05145664	289	512
30	21SWK05635687	298	514
31	21SVK81325952	19	512
32	21SVK81905928	19	517
33	21SWK00476056	124	712
34	21SWK00396058	124	712
35	21SWK00296055	82	712
36	21SVK86286064	131	769
37	21SVK82476007	199	515
38	21SVK82146051	199	512
39	21SVK88916173	46	596
40	21SVK94786162	50	825
41	21SWK06276160	208	513
42	21SWK06656132	206	513
43	21SVK96576359	248	598
44	21SVK96656361	304	582
45	21SVK96746359	304	563

NOTE: ALL TARGET TYPES AVAILABLE

(PAGE FORWARD FOR CONTINUATION)

Figure 7-42. Target Sites List Page Display (Sheet 2)

```
MET    00:00:00     INTEG  2
AMI     0   TEE    0   IC   -1
REPLAY:  RECORD        :00:00
FROZEN:

RA        1993   ALT      2507
AS   0     VS    0     HDG   19
NR  100  TQ1    17  TQ2    17

ROCKET-P- NORM-C- NORM        0
GUN    -P- FXD -C- NORM     320
MISSLE-P- ON   -C- ON  -      8
P-   0.000-137.800-300.000
C-   0.000-110.000
STUDENT     0       EVENT     0

500       TARGET INDEX

501-520  TEE SETS

530       TARGET STATUS
531       TARGET TYPE LIST
532-535  TARGET SITE LIST
540       TGT SITE OVERVW
541-574  BAT POS TGT SITE

580       TARGET CONTROL
581       VISIONICS POINT-
          ING/REMOTE DESIG
582       REMOTE DESIG
583       TARGET EVAL

590       WEAPONS LOADING
591       ROCKET CONFIG
592       FARP CONTROL
593       THRT SCRNG GRPH
594       THREAT SCORING
595-596  OWNSHP ENGA PRFM
597       OWNSHP WPN SCRNG
```

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TARGET SITES LIST (STATIONARY)

SITE #	POSITION	HEADING (MAG)	ALTITUDE (FT MSL)
46	21SVK96776366	215	557
47	21SWK06386471	199	515
48	21SWK06876456	199	517
49	21SVK85966550	109	721
50	21SVK86046551	95	717
51	21SVK86116555	74	725
52	21SVK92226620	64	524
53	21SVK91736618	64	515
54	21SVK88816664	142	718
55	21SVK81296718	19	515
56	21SVK81896729	368	519
57	21SVK87406766	353	774
58	21SWK04126807	127	512
59	21SWK04416837	131	512
60	21SVK97396846	122	620
61	21SVK97456877	123	560
62	21SVK88776855	94	712
63	21SVK95276910	119	517
64	21SVK95486933	141	514
65	21SWK06426965	289	512
66	21SWK06856937	312	521
67	21SVK95517111	14	522
68	21SVK95517122	19	522
69	21SVK95517130	14	522
70	21SVK95557138	59	532

NOTE: ALL TARGET TYPES AVAILABLE

(PAGE FORWARD FOR CONTINUATION)

Figure 7-42. Target Sites List Page Display (Sheet 3)

```
MET    00:00:00     INDEP   5
AMI     0   TEE    0   IC   -3
REPLAY:  RECORD       :00:00
FROZEN:

RA             0   ALT       512
AS    0     VS    0     HDG   19
NR  100  TQ1     18  TQ2     18

ROCKET-P- NORM-C- OFF -      0
GUN    -P- FXD -C- OFF -     0
MISSLE-P- ON  -C- OFF -      0
P-   0.000-  30.000-300.000
C-   0.000-128.000
STUDENT      0      EVENT    0

500       TARGET INDEX

501-520  TEE SETS

530       TARGET STATUS
531       TARGET TYPE LIST
532-535  TARGET SITE LIST
540       TGT SITE OVERVW
541-574  BAT POS TGT SITE

580       TARGET CONTROL
581       VISIONICS POINT-
          ING/REMOTE DESIG
582       REMOTE DESIG
583       TARGET EVAL

590       WEAPONS LOADING
591       ROCKET CONFIG
592       FARP CONTROL
593       THRT SCRNG GRPH
594       THREAT SCORING
595-596  OWNSHP ENGA PRFM
597       OWNSHP WPN SCRNG
```

:00:00 PAGE 535

TARGET SITES LIST (STATIONARY)

SITE #	POSITION	HEADING (MAG)	ALTITUDE (FT MSL)
71	21SVK90727071	169	523
72	21SVK90267056	91	512
73	21SVK82527040	205	616
74	21SVK82177051	199	549
75	21SVK86627146	113	718
76	21SWK00247131	319	520
77	21SWK00357143	319	517
78	21SVK81887257	22	517
79	21SVK81487255	19	524
80	21SWK06317345	304	512
81	21SWK06707346	304	515
82	21SVK97587472	146	523
83	21SVK97547475	146	520
84	21SVK97287468	36	512
85	21SVK97267462	36	512
86	21SVK90667438	1	590
87	21SWK01827641	169	822
88	21SWK01757661	105	871
89	21SVK83707657	109	514
90	21SVK83247665	116	513
91	21SVK81457761	30	521
92	21SVK81937747	19	515
93	21SVK90277852	199	512
94	21SVK90707870	199	523
95	21SVK87467925	151	520
96	21SVK87747946	151	532
97	21SVK95727959	130	712
98	21SWK02477939	128	793
99	21SWK06607943	199	518

NOTE: ALL TARGET TYPES AVAILABLE

(PAGE FORWARD FOR CONTINUATION)

Figure 7-42. Target Sites List Page Display (Sheet 4)

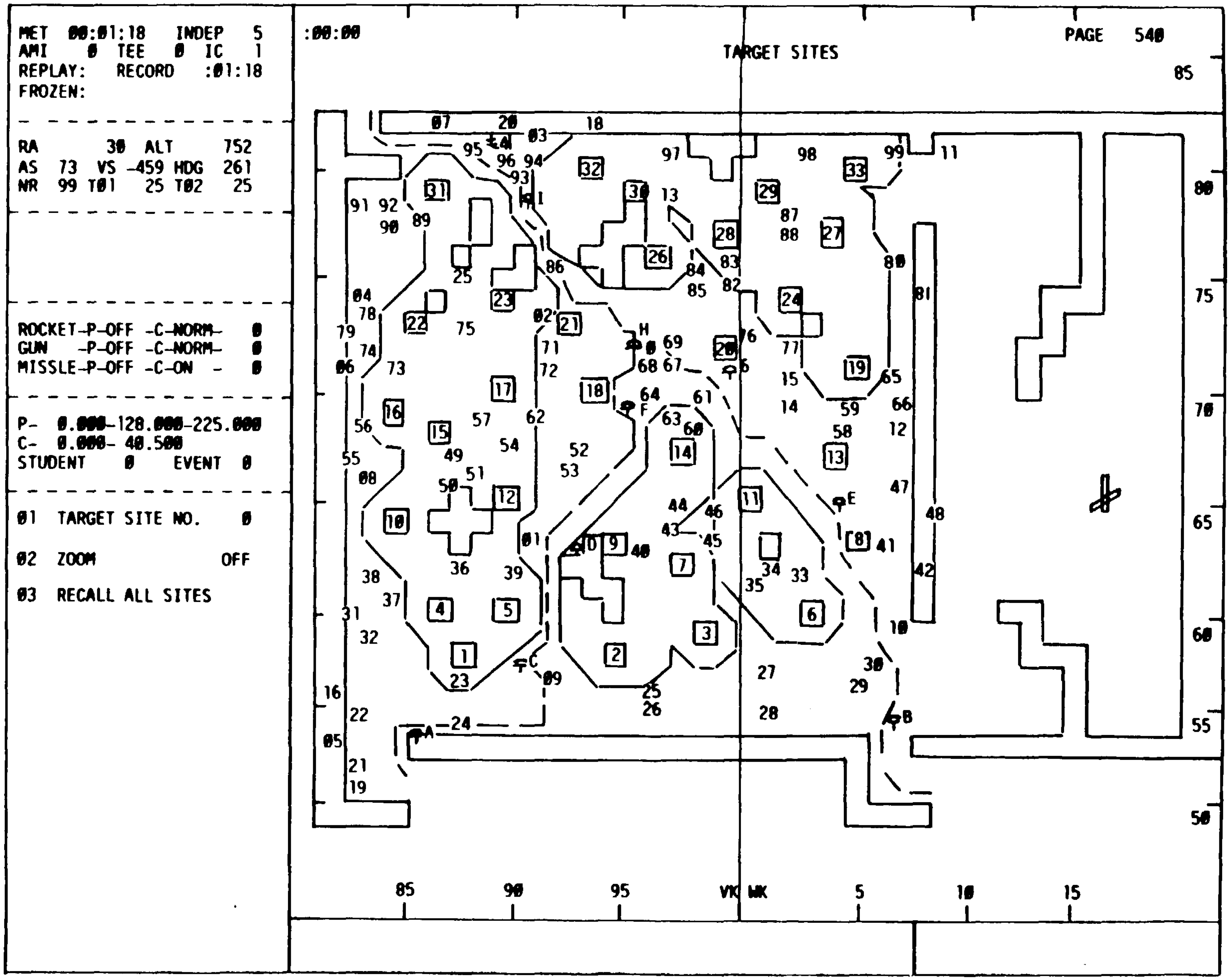


Figure 7-43. Target Sites Overview Page Display

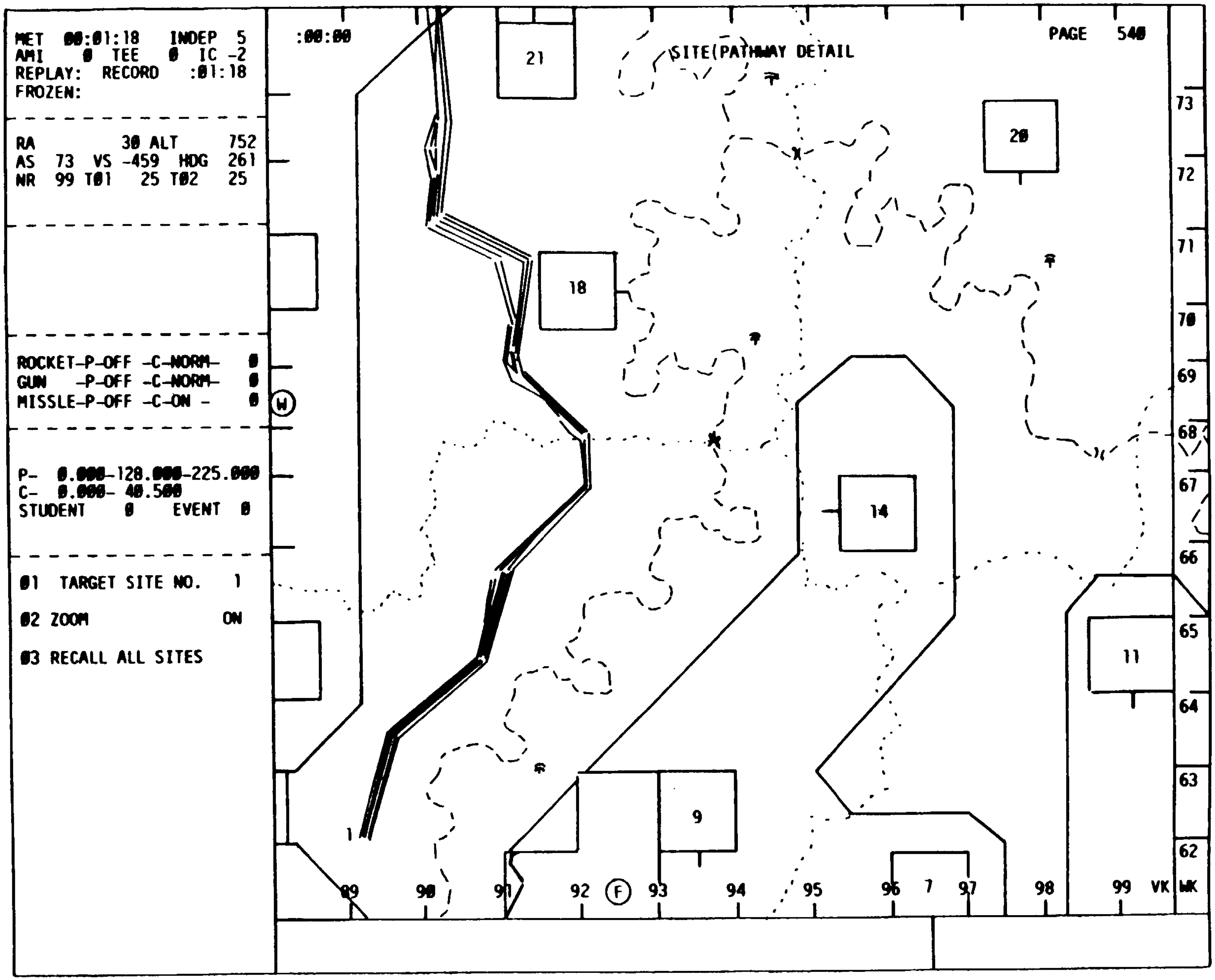


Figure 7-44. Target Sites Overview (Zoom On) Page Display

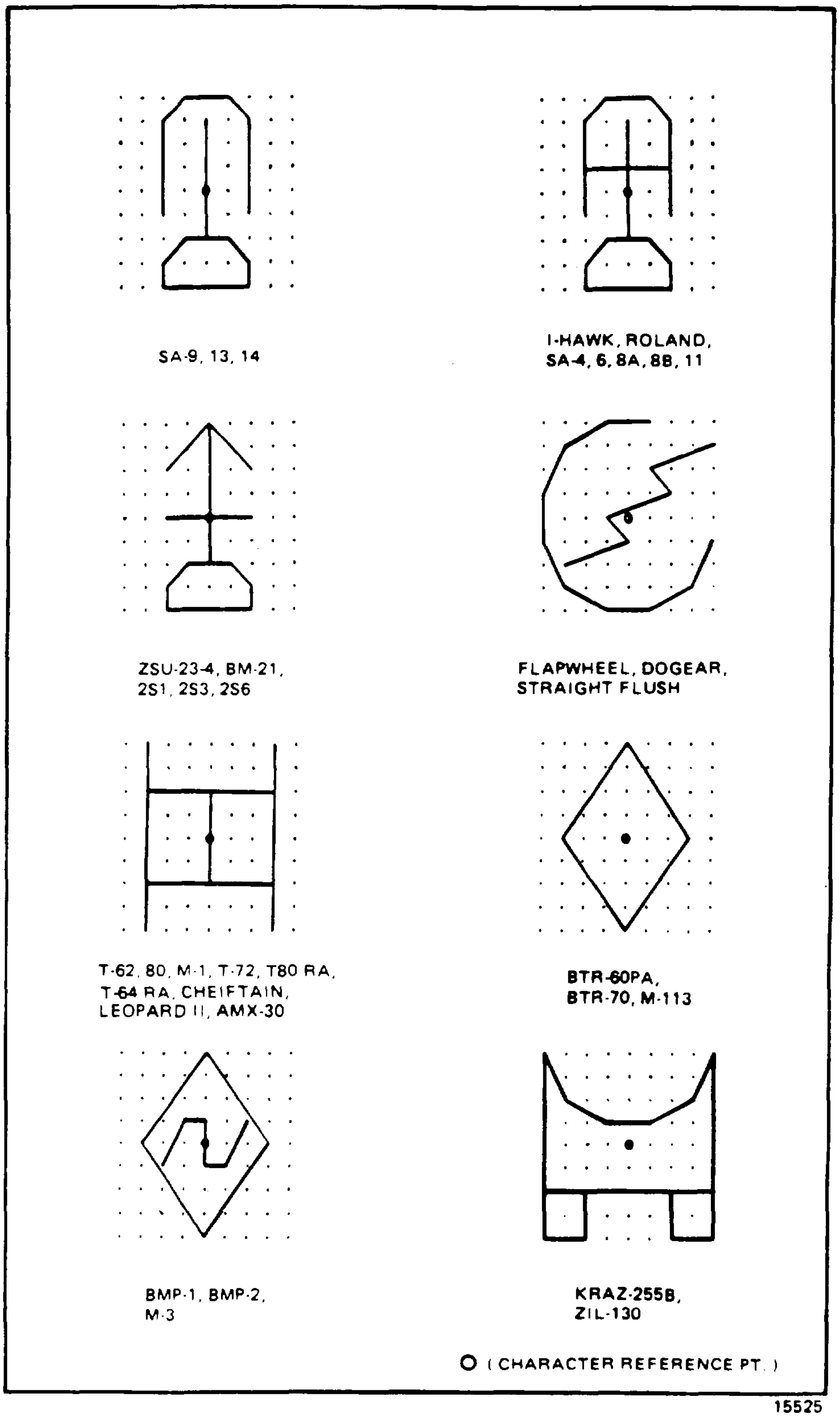


Figure 7-45. Typical Target Symbols (Sheet 1)

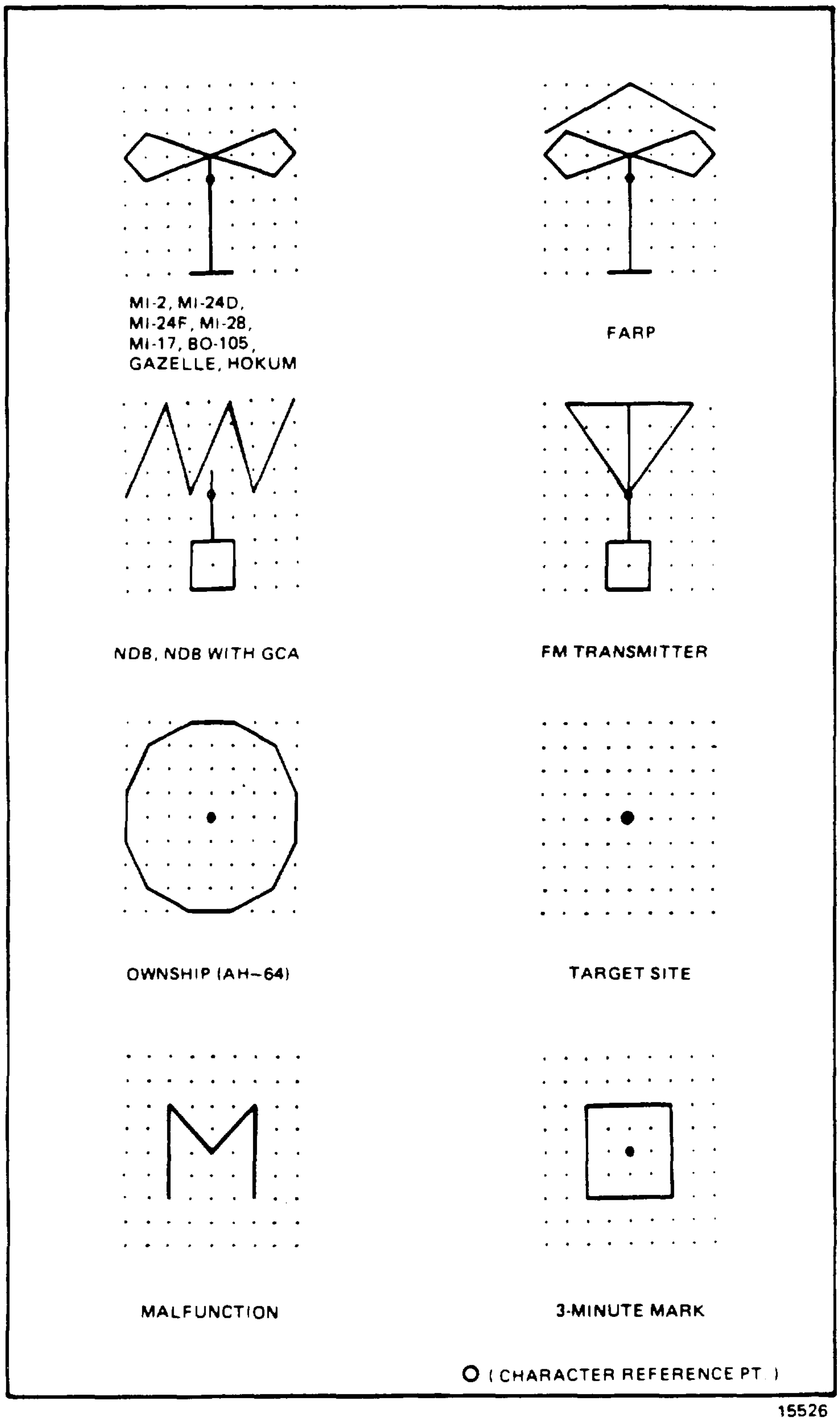


Figure 7-45. Typical Target Symbols (Sheet 2)

b. Target site pathway detailed displays can be called up for display via the data entry keyboard and the reference numbers in the index and control area when target site overview CRT page 540 is displayed (e.g., 01 TAB 05 ENTER, displays the pathway, If any. associated with target number 5). These pathways are used with TEE's and with the manual target control page to designate the path to be traveled by a specific type target (e.g., T-80. T-62, etc.). When a target site is is entered, all target reference numbers disappear from the display. To return the target reference numbers. key in 03 ENTER. This recalls all sites to the display and deletes the pathway previously displayed. Command 03 is used to recall all sites and terrain markings.

c. The target site overview page is used to:

Determine relative location of each target site within visual gaming area
Determine which targets art active
Determine type targets that have been placed on the 10 active target sites
Call up and display target site pathway detailed displays

7-44. BATTLE POSITION TARGET SITES. The battle position target site (available target sites reference) CRT pages (figure 7-46) provide graphic data related to battle/firing positions and associated target sites and provide the instructor with a 12- by 12-km graphic overview of the target engagement area of interest.

a. There are 34 designated battle positions included in the visual gaming area. These battle positions include from one to tight firing positions each. The battle positions are designed in l-kilometer squares and can be entered from only one side of the square kilometer. The battle position is composed of relatively high terrain that overlooks target engagement areas (low terrain containing target sites). Within each battle position are nap-of-the-earth (NOE) routes leading to the firing positions.

b. Battle position target sites are always oriented on the CRT display so that north is up. Bach battle position target site shows the battle position by number and all of the target sites within its 10-kilometer range. Since each battle position has one or more firing positions. several fields-of-fire are available to the trainee. Bach battle position has been designed with tight selectable fields-of-fire for the Instructor to choose from when viewing the target sites in the target engagement areas.

c. The battle position target site pages are in group 5 (TARGETS) and can be accessed via the data entry keyboard (CRT pages 541-574). In the index and control area of the CRT page when battle position target site maps art displayed, control reference numbers are provided to permit selection of fields-of-fire. Each battle position has only one entrance side. shown on the map with an index. Starting in the upper right-hand corner of the battle position, the fields-of-fire are numbered 1 through 8 in a clockwise direction. In the control area, reference number 01 is the command for selecting the FIELD OF FIRE number. Reference numbers 02 and 03 are aircraft TRACK ERASE and TRACK RECALL, respectively. Reference number 01 can be entered via the data entry keyboard while the map is displayed (e.g., 01 TAR 6 ENTER) and causes the viewing direction of the field-of-fire to change for the specified battle position. As fields-of-fire art selected (advanced), the map automatically repositions in relation to the battle position to maintain the maximum field-of-view in the direction of the field-of-fire (i.e., when field-of-fire 6 is selected, the battle position is displayed on the left side of the CRT page and

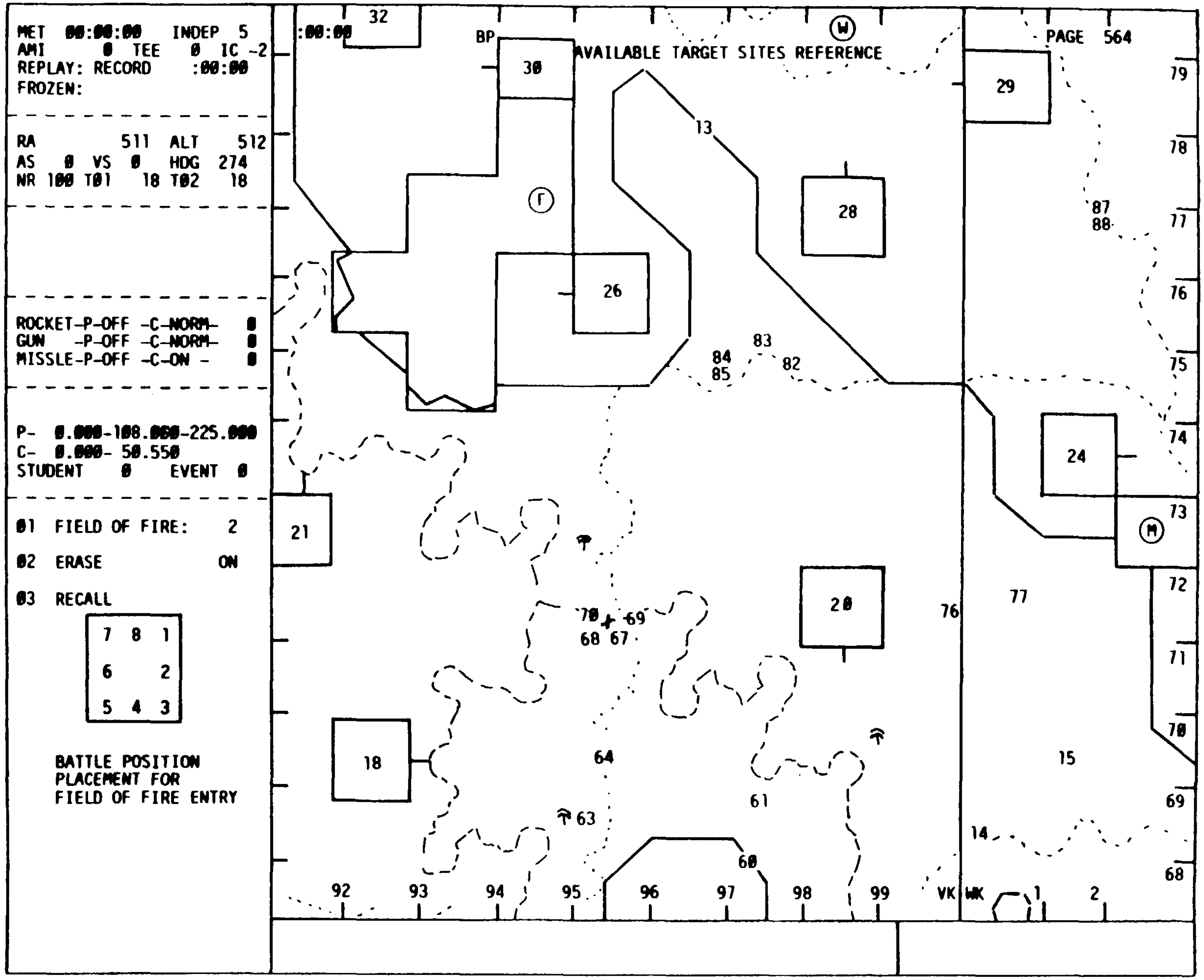


Figure 7-46. Battle Position Target Site Map Page Display

centered vertically: when field-of-fire 2 is selected, the battle position is displayed on the right side of the CRT page and centered vertically).

d. When targets have been selected and positioned on the target sites within a battle position target site map, target symbols appear on the map. When intervisibility or LOS exists between the ownship and any target(s), the target symbol(s) illuminate in high intensity.

e. Battle position target site maps CRT pages can be used to determine which target sites are in proximity of a battle/firing position. and to observe graphically when intervisibility exists between the ownship and targets. These CRT pages are primarily used by the instructors for planning new TEE sets. as they do not display the ownship symbol. Battle position maps (CRT pages 301-334) should be used to monitor training activity during normal simulation training periods.

7-45, MANUAL TARGET CONTROL. The target control CRT page provides the instructor with the capability to manually select targets and designate the characteristics associated with them. This page includes 22 command entry lines that are used to activate and control target/characteristics.

The target control page (figure 7-47) is in group 5 (TARGETS) and can be accessed via the data entry keyboard by keying in 580 DISPL. The page permits selection and insertion of one target at a time into the simulation. Up to 10 targets can be selected and active in the simulation at any one time. Up to five of these targets can be designated as moving targets. (Table 7-10 lists the control commands, range of values, keystrokes required, and comments related to use of the target control CRT page.)

NOTE

580-01 must be set to OFF to manually activate/remove targets.

b. The target control page is used to temporarily inhibit TEE events from occurring (activation of motion and onset of hostility) and to establish a temporary threat array for a training mission.

NOTE

While manual selection of targets provides considerable flexibility with selection of threat arrays, such selection can become overly time-consuming because of the number of entry commands required. If an appropriate TEE is available, its selection and use will reduce setup time. Triggering contingencies are not available with manual target control. Consequently, threat activities are activated when freeze is deactivated. To establish control of threat activity and maintain visual contact with targets, manual control is best employed while the simulator is in freeze at the desired battle position.

7-46. VISIONICS POINTING/REMOTE DESIGNATOR. The visionics pointing/remote designator control page (figure 7-48) is a dual-function control page. First, during independent mode training, it permits the instructor to act as the missing crewmember to identify and designate targets. Second, it permits the selection and designation of targets for engagement via remote designators (GLLD, etc.). The page includes five command reference lines; line 01 is used for visionics pointing, and lines 02 through 05 are used for remote designation.

```
MET 00:00:39   INDEP 5
AMI   0  TEE   0  IC  1
REPLAY: RECORD    :00:39
FROZEN:
-------------------------
RA            0 ALT  512
AS   0  VS  0   HDG  19
NR 100 T01   16 T02  19
-------------------------

-------------------------
ROCKET-P-OFF -C-NORM-  38
GUN   -P-OFF -C-FXD -1200
MISSLE-P-OFF -C-ON -    8
-------------------------
P-  0.000-100.000-225.000
C-  0.000- 50.550
STUDENT    0    EVENT  0
-------------------------
    TARGET STATUS

LETHALITY LEVEL      5
HOSTILITY INT        OFF


TARGET   S H M L K S P
REF TYPE T O O O I I A
NO       M S V S L T T
         B T E   L E H
```

```
:00:00                                                                   PAGE  500
                              MANUAL TARGET CONTROL

TEE CONTROL

     01  TEE STATUS                                                      OFF
     02  SUSPENDED TEE EVENTS                                            NOT SUSPENDED

TARGET ACTIVATE/REMOVE

     03  TARGET REFERENCE NUMBER (1-10)                                  0
     04  TARGET TYPE NUMBER (1-22, 27-48)                                0
     05  TARGET SITE NUMBER (1-99)                                       0
     06  HOSTILE ACTIVITY                                                NO
     07  MISS-HIT (MISS=0 HIT = MALF NO. 1                               0
     08  INFRARED                                                        COLD
     09  MOTION                                                          OFF
     10  PATHWAY (0=CLEAR ENTRY, 1-5=GND OR AIR PATH, 7=AIR PATH)        0
     11  SPEED (0-200 KMPH)                                              0
     12  ACTIVATE TARGET
     13  REMOVE TARGET
     99  REMOVE ALL TARGETS
TARGET HOSILITY EDIT

     14  TARGET REFERENCE NUMBER (1-10)                                  0
     15  HOSILITY (0=OFF, 1=ON)

     16  HOSILITY EDIT FOR ALL TARGETS (0=OFF, 1=ON)



TARGET MOTION EDIT

     17  TARGET REFERENCE NUMBER (1-10)                                  0
     18  MOTION (0=OFF, 1=ON)
     19  SPEED (0-200 KMPH)

     20  MOTION FOR ALL TARGETS (0=OFF, 1=ON)
     21  SPEED FOR ALL TARGETS (0-200 KMPH)
```

Figure 7-47. Manual Target Control Page Display

MET 00:00:00 INDEP 5
AMI 0 TEE 0 IC -3
REPLAY: RECORD :00:00
FROZEN:

RA 0 ALT 512
AS 0 VS 0 HDG 19
NR 100 TQ1 18 TQ2 18

ROCKET-P- NORM-C- OFF - 0
GUN -P- FXD -C- OFF - 0
MISSLE-P- ON -C- OFF - 0
P- 0.000- 30.000-300.000
C- 0.000-128.000
STUDENT 0 EVENT 0

500 TARGET INDEX

501-520 TEE SETS

530 TARGET STATUS
531 TARGET TYPE LIST
532-535 TARGET SITE LIST
540 TGT SITE OVERVW
541-574 BAT POS TGT SITE

580 TARGET CONTROL
581 VISIONICS POINTING/REMOTE DESIG
582 REMOTE DESIG
583 TARGET EVAL

590 WEAPONS LOADING
591 ROCKET CONFIG
592 FARP CONTROL
593 THRT SCRNG GRPH
594 THREAT SCORING
595-596 OWNSHP ENGA PRFM
597 OWNSHP WPN SCRNG

:00:00

PAGE 581

VISIONICS POINTING/REMOTE DESIGNATOR CONTROL

01	VISIONICS POINTING TARGET REFERENCE NUMBER	0
02	REMOTE DESIGNATOR TARGET REFERENCE NUMBER	0
03	REMOTE DESIGNATOR LOCATION	31NAL66020000
04	LASER CODE (1)A (2)B (3)C (4)D (5)E (6)F (7)G (8)H	0
05	REMOTE DESIGNATOR	OFF

Figure 7-48. Visionics Pointing/Remote Designator Control Page Display

Table 7-10. Instructions for Use of Manual Target Control CRT Page

Command	Range of value	Keystroke	Comments
		TEE CONTROL	
01 TEE STATUS	OFF/ON	01 ENTER	Must be set to OFF to activate/remove targets. When set to ON, motion and hostility edit can be done.
02 SUSPEND TEE EVENTS	YES/NO	02 ENTER	Suspends active TEE. Temporarily inhibits automatic target event insertion. Manual target control prohibited.
		TARGET ACTIVATE/REMOVE	
03 TARGET SITE REFERENCE NUMBER	1 - 10	03 TAB N ENTER	N = 1 to 10. Site reference number corresponds to reference number on target status page. Used to count targets being inserted. (Refer to commands 09, 10, and 11 below.)
04 TARGET TYPE NUMBER	1 - 22 27 - 48	04 TAB N ENTER	N = 1 to 22 and 27 to 48. Target type number corresponds to type number on target type list and identifies specific target type.
05 TARGET SITE NUMBER	1 - 99	05 TAB N ENTER	N = 1 to 99. Site number corresponds to target site list and identifies target site location.
06 HOSTILE ACTIVITY	YES/NO	06 ENTER	YES enables radar/weapons firing at ownship.
07 MISS-HIT	0 or 5-digit number	07 TAB N ENTER	N = 5-digit malfunction number from malfunction list for a HIT. Defines malfunction when this target hits ownship. N - 0 for no malfunction with threat hit.
08 INFARED	HOT/COLD	08 ENTER	Defines hot/cold infrared signature.

Table 7-10. Instructions for Use of Manual Target Control CRT Page - Continued

Command	Range of value	Keystroke	Comments
	TARGET ACTIVATE/REMOVE - continued		
09 MOTION	ON/OFF	09 ENTER	Enables pathway travel for target site reference numbers 1-5.
10 PATHWAY	0-5, 7	10 TAB N ENTER	N = 0 to 5,7. Defines pathway target will travel for site reference numbers l-5, and 7 for air pathway.
11 SPEED	0 - 40 (ground) 0 - 200 (air)	11 TAB N ENTER	N = 0 to 40/200. Kilometers per hour in 10-kph increments.
12 ACTIVATE TARGET		12 ENTER	Inserts target into simulation and activates motion/hostility.
13 REMOVE TARGET		13 ENTER	Deletes target from simulation.
99 REMOVE ALL TARGETS		99 ENTER	Deletes all targets from simulation.
	TARGET HOSTILITY EDIT		
14 TARGET REFERENCE NUMBER	1 - 10	14 TAB N ENTER	N = 1 to 10. Site reference number on target status page. Used to count targets being inserted.
15 HOSTILITY	0 - 1	15 TAB N ENTER	N - 0 to 1. 0 for hostility off and 1 for hostility on for selected target.
16 HOSTILITY EDIT FOR ALL TARGETS	0 - 1	16 TAB N ENTER	N= 0 to 1. 0 for hostility off and 1 for hostility on for all active targets.
	TARGET MOTION EDIT		
17 TARGET REFERENCE NUMBER	1 - 10	17 TAB N ENTER	N= 1 to 10. Site reference number on target status page. Used to count targets being inserted.

Table 7-10. Instructions for Use of Manual Target Control CRT Page - Continued

Command	Range of value	Keystroke	Comments
	TARGET MOTION EDIT - continued		
18 MOTION	0 - l	18 TAB N ENTER	N = 0 to 1. 0 turns motion off and 1 turns motion on. Enables pathway travel for target site reference numbers l-5.
19 SPEED	0 - 40 (ground) 0 - 200 (air)	19 TAB N ENTER	N = 0 to 40/200. Kilometers per hour in 10-kph increments.
20 MOTION FOR ALL TARGETS	0 - 1	20 TAB N ENTER	N = 0 to 1. 0 turns motion for all targets off and 1 turns motion for all targets on.
21 SPEED FOR ALL TARGETS	0 - 40	21 TAB N ENTER	N = 0 to 40. Kilometers per hour in 10-kph increments for all targets.

NOTE

Commands 02, 06, 08, and 09 are Booleans and, when entered a second time, provide the reciprocal command (e.g., YES or NO, ON or OFF, etc.). Commands 14, 15, and 17 through 19 affect only those targets referenced in their respective sections. Commands 16, 20, and 21 affect all targets referenced in their respective sections. When commands 14, 15, and 17 through 19 are used, there are no display values for commands 16, 20, and 21.

a. The visionics pointing/remote designator control page is in group 5 (TARGETS) and can be accessed via the data entry keyboard by keying in 581 DISPL.

b. The instructor uses line 01 to identify a target for the pilot or CPG trainee during independent mode training. The target reference number (line 01) is selected from the target status page (value 1 to 10). When the reference number is entered, trainee visionics art cued to a line-of-sight between the ownship and the designated target after the trainee has executed the necessary procedures.

c. The instructor completes data entries for lines 02 through 05 on the visionics pointing/remote designator control page to select and designate targets for attack by a remote designator (e.g., GLLD). This allows the CPG trainee to practice all the procedures associated with the selection, preparation, and launching of a missile to be controlled by a remote designator.

NOTE

Command lines 01 through 04 require that TAB be depressed between the command line entry and the value (e.g.. 01 TAB 09 ENTER). Line 05 is Boolean for ON/OFF and requires only 05 and ENTER. The simulation assumes that a line-of-sight exists for the UTM selected. A quick method for entering UTM is to pick a grid intersection within the acquisition fan and enter those coordinates (e.g., QGl2003400).

7-47. TARGET EVALUATION. The target evaluation page provides the capability to selectively review TEE's or manually inserted target arrays.

a. The six command/reference lines on the CRT page (figure 7-49) are:

(1) Lines 02 and 04 through 06 establish a position for the ownship in the visual gaming area and identify the targets (TEE or manual) to be observed.

(2) Line 03 INVISIBLE AH-64, when YES, allows the instructor to observe targets without triggering hostility, motion, or hits.

(3) Line 03 INVISIBLE AH-64, when NO, permits events to occur as programmed when the TARGET EVALUATION MODE is activated.

(4) Line 01 TARGET EVALUATION MODE is used to activate/deactivate the evaluation feature.

b. The target evaluation page is in group 5 (TARGETS) and can be accessed via the data entry keyboard by keying in 583 DISPL. The primary purpose of the target evaluation page is to permit instructors and/or course developers who prepare TEE's to observe and visually review the tactical array of targets placed in TEE's. A secondary, but equally important, purpose is to allow flight instructors undergoing simulator instructor training to observe and review targets within TEE's and targets that have been manually selected for subsequent training periods. The instructor may find this feature useful with some trainees early in training. Many target sites are visible from more than one battle position; the target evaluation page permits quick positioning to battle positions and firing positions to determine the most suitable locations from which to conduct training.

c. After completing entries for lines 02 through 06, the simulator and the associated visual display are initialized at the selected UTM to permit observation by keying in 01 ENTER. Heading and altitude can be changed as desired via lines 05 and 06 while at the evaluation position. Activating the HIT OVERRIDE switchlight permits observing the targets and checking the operation of triggering parameters (e.g., enable motion and hostility with line-of-sight) without being hit.

d. The target evaluation page is used to:

Permit instructors and course developers to review newly prepared TEE's
Permit familiarization of TEE's for new instructors
Permit instructors to review manual target arrays
Familiarize trainees with firing positions and threat arrays

```
MET   03:14:57    INTEG  2  :00:00                                    PAGE  583
AMI    0  TEE   0  IC   -1
REPLAY:  RECORD     :05:00                 TARGET EVALUATION
FROZEN:

RA          0  ALT     512        01  TARGET EVALUATION MODE           OFF
AS   0   VS   0    HDG  114
NR  100  TQ1    34  TQ2    35     02  TEE SET NUMBER                     0
                                      (ENTER 0 FOR MANUAL)

                                  03  INVISIBLE AH-64                  OFF

ROCKET-P- NORM-C- NORM      0
GUN    -P- FXD -C- NORM-  320     04  AIRCRAFT POSITION       21SWK15586571
MISSLE-P- ON  -C- ON  -     8
P-110.000-108.000-0.000
C-110.000-110.000                 05  MAGNETIC HEADING                 114
STUDENT    0     EVENT    0

500       TARGET INDEX            06  RADAR ALTITUDE                     0

501-520  TEE SETS

530       TARGET STATUS
531       TARGET TYPE LIST
532-535  TARGET SITE LIST
540       TGT SITE OVERVW
541-574  BAT POS TGT SITE

580       TARGET CONTROL
581       VISIONICS POINT-
          ING/REMOTE DESIG
582       REMOTE DESIG
583       TARGET EVAL

590       WEAPONS LOADING
591       ROCKET CONFIG
592       FARP CONTROL
593       THRT SCRNG GRPH
594       THREAT SCORING
595-596  OWNSHP ENGA PRFM
597       OWNSHP WPN SCRNG
```

Figure 7-49. Target Evaluation Page Display

7-48. WEAPONS LOADING/ROCKET CONFIGURATION. The weapons loading pages (figures 7-50 and 7-51) show the 15 weapons configurations available in the CMS. Mounting hardware, weapons, and ammunition quantities associated with each configuration are also shown. The variety of available loads gives the instructor maximum flexibility for selection of mission loads.

a. Loads 02 through 05 are for anti-armor missions and include only Hellfire missiles and 30-mm. Loads 06 through 15 are for covering force and airmobile escort missions. These loads all include 2.75-inch rockets. The following five rocket types art available in the simulated weapons system:

High-explosive, RC fuse	RC4
High-explosive, point-detonating	PD4
Illumination	6IL
Smoke (white phosphorus), time fuse	SK4
Multipurpose submunitions, time fuse	6MP

b. The weapons loading page is in group 5 (TARGETS) and can be accessed via the data entry keyboard by keying in 590 DISPL. The line number associated with each load is the number to be entered on tither line 06 of the IC set page, line 06 of the current conditions page, or line 01 of the weapons loading page. When a weapons load has been selected and activated, that load is reflected in the weapons status area of the CRT display.

c. Each load configuration that includes rockets indicates the number of rockets on each wing and a reference number to identify the rocket load configuration. (See figure 7-50.) That is, the reference number identifies what type rocket is loaded and available for use in each zone of the rocket system. By paging forward (PAGE FWD) from weapons loading CRT page 590, rocket configuration CRT page 591 (figure 7-51) is displayed. This page lists the ten rocket load configurations and identifies what type rockets have been loaded in the weapons load indicated on CRT page 590.

d. The weapons loading page is used to determine what weapons loads are available for training, to select a load configuration to be entered in IC or CC page(s), and to determine what types of rockets are available.

7-49. FARP CONTROL. The forward arming and refueling point (FARP) control page (figure 7-52) lists the 10 sites on which the FARP can be established in the visual gaming area. The list includes the site number, name/description, and UTM location of the site. The FARP area includes a landing area with lighted inverted-Y fuel points, ammunition boxes, and fuel bladders. However, refueling and rearming are actually performed by the instructor modifying the appropriate lines on the CC page during training periods.

a. The FARP control page is in group 5 (TARGETS) and can be accessed via the data entry keyboard by keying in 592 DISPL. Only one model of a FARP is available in the CMS visual database. This FARP can be placed on any one of the sites of the FARP control page.

b. The site number listed to the left of the name/description is the number to be entered on line 29 of the IC or CC page. The FARP can be repositioned in the gaming area

```
MET    00:00:00     INDEP  5
AMI     0   TEE     0   IC  -3
REPLAY:  RECORD        :00:00
FROZEN:

RA             0   ALT     512
AS    0    VS    0     HDG   19
NR  100  TQ1     18  TQ2    18

ROCKET-P- NORM-C- OFF-      0
GUN    -P- FXD -C- OFF-      0
MISSLE-P- ON   -C- OFF-      0
P-   0.000- 30.000-300.000
C-   0.000-128.000
STUDENT     0      EVENT     0

500      TARGET INDEX

501-520 TEE SETS

530      TARGET STATUS
531      TARGET TYPE LIST
532-535 TARGET SITE LIST
540      TGT SITE OVERVW
541-574 BAT POS TGT SITE

580      TARGET CONTROL
581      VISIONICS POINT-
          ING/REMOTE DESIG
582      REMOTE DESIG
583      TARGET EVAL

590      WEAPONS LOADING
591      ROCKET CONFIG
592      FARP CONTROL
593      THRT SCRNG GRPH
594      THREAT SCORING
595-596 OWNSHP ENGA PRFM
597      OWNSHP WPN SCRNG
```

:00:00 PAGE 590

WEAPONS LOADING

01 SELECT LOAD # 1

LOAD #	LEFT WING STORES OUTBOARD	LEFT WING STORES INBOARD	CENTER GUN ROUNDS	RIGHT WING STORES INBOARD	RIGHT WING STORES OUTBOARD	REMARKS
1	CLEAN	CLEAN	0	CLEAN	CLEAN	
2	CLEAN	4 HF	320	4 HF	CLEAN	
3	2 HF	4 HF	540	4 HF	2 HF	
4	4 HF	4 HF	1200	4 HF	4 HF	
5	CLEAN	4 HF	1200	4 HF	CLEAN	
6	19 RKTS	4 HF	1200	4 HF	19 RKTS	SEE RKT CONFIG
7	19 RKTS	4 HF	1200	4 HF	19 RKTS	SEE RKT CONFIG
8	19 RKTS	4 HF	1200	4 HF	19 RKTS	SEE RKT CONFIG
9	19 RKTS	4 HF	1200	4 HF	19 RKTS	SEE RKT CONFIG
10	CLEAN	19 RKTS	1200	19 RKTS	CLEAN	SEE RKT CONFIG
11	CLEAN	19 RKTS	1200	19 RKTS	CLEAN	SEE RKT CONFIG
12	CLEAN	19 RKTS	1200	19 RKTS	CLEAN	SEE RKT CONFIG
13	19 RKTS	19 RKTS	1200	19 RKTS	19 RKTS	SEE RKT CONFIG
14	19 RKTS	19 RKTS	1200	19 RKTS	19 RKTS	SEE RKT CONFIG
15	19 RKTS	19 RKTS	1200	19 RKTS	19 RKTS	SEE RKT CONFIG

Figure 7-50. Weapons Loading Page Display

```
MET    00:00:00    INDEP  5
AMI    0   TEE   0   IC  -3
REPLAY:  RECORD      :00:00
FROZEN:

RA            0   ALT    512
AS   0    VS   0    HDG   19
NR  100  TQ1   18  TQ2    18

ROCKET-P- NORM-C- OFF -     0
GUN    -P- FXD -C- OFF -    0
MISSLE-P- ON  -C- OFF -     0
P-   0.000- 30.000-300.000
C-   0.000-128.000
STUDENT     0     EVENT     0

500      TARGET INDEX

501-520 TEE SETS

530      TARGET STATUS
531      TARGET TYPE LIST
532-535 TARGET SITE LIST
540      TGT SITE OVERVW
541-574 BAT POS TGT SITE

580      TARGET CONTROL
581      VISIONICS POINT-
          ING/REMOTE DESIG
582      REMOTE DESIG
583      TARGET EVAL

590      WEAPONS LOADING
591      ROCKET CONFIG
592      FARP CONTROL
593      THRT SCRNG GRPH
594      THREAT SCORING
595-596 OWNSHP ENGA PRFM
597      OWNSHP WPN SCRNG
```

:00:00 PAGE 591

ROCKET CONFIGURATION

WEAPONS LOAD #	ZONE A (24 OTBD)	ZONE B (8 OTBD)	ZONE C (24 INBD)	ZONE D (8 INBD)	ZONE E (6 OUT/6 IN)
6	PD4	6MP	-	-	6SK/ -
7	6MP	RC4	-	-	6SK/ -
8	6MP	PD4	-	-	RC4/ -
9	PD4	6IL	-	-	6MP/ -
10	-	-	6MP	RC4	- /6SK
11	-	-	6MP	PD4	- /RC4
12	-	-	PD4	6IL	- /6MP
13	6MP	PD4	6MP	RC4	6SK/6SK
14	PD4	6MP	PD4	6MP	RC4/RC4
15	PD4	6IL	6MP	6IL	RC4/RC4

THUMBWHEEL	ROCKET-WARHEAD-FUZE	DESCRIPTION
PD4	MK 40 - M151 -M433	HIGH EXPLOSIVE, POINT DETONATING FUZE
RC4	MK 40 - M151 -M423	HIGH EXPLOSIVE, RC FUZE
6IL	MK 66 - M257	ILLUMINATION
6SK	MK 66 - M264 -M439	SMOKE(WHITE PHOSPHORUS), TIME FUZE
6MP	MK 66 - M261 -M439	MULTIPURPOSE SUBMUNITIONS, TIME FUZE

Figure 7-51. Rocket Configuration Page Display

MET 00:00:00 INDEP 5
AMI 0 TEE 0 IC -3
REPLAY: RECORD :00:00
FROZEN:

RA 0 ALT 512
AS 0 VS 0 HDG 19
NR 100 TQ1 18 TQ2 18

ROCKET-P- NORM-C- OFF - 0
GUN -P- FXD -C- OFF - 0
MISSLE-P- ON -C- OFF - 0
P- 0.000- 30.000-300.000
C- 0.000-128.000
STUDENT 0 EVENT 0

500 TARGET INDEX

501-520 TEE SETS

530 TARGET STATUS
531 TARGET TYPE LIST
532-535 TARGET SITE LIST
540 TGT SITE OVERVW
541-574 BAT POS TGT SITE

580 TARGET CONTROL
581 VISIONICS POINT-ING/REMOTE DESIG
582 REMOTE DESIG
583 TARGET EVAL

590 WEAPONS LOADING
591 ROCKET CONFIG
592 FARP CONTROL
593 THRT SCRNG GRPH
594 THREAT SCORING
595-596 OWNSHP ENGA PRFM
597 OWNSHP WPN SCRNG

:00:00 PAGE 592

FORWARD ARMING AND REFUELING POINT (FARP) CONTROL

01 SELECT FARP # 0

FARP #	DESCRIPTION	LOCATION
1 (A)	SOUTHWEST OF BATTLE POSITION 1 NEAR BEND IN RIVER	21SVK8364454457
2 (B)	SOUTHEAST OF BATTLE POSITION 6 NEAR ENTRANCE TO PASS	21SWK0636055531
3 (C)	SOUTHEAST OF BATTLE POSITION 5 NEAR LOOP IN RIVER	21SVK8963857518
4 (D)	BETWEEN BATTLE POSITIONS 12 AND 9 NEAR RIVER	21SVK9188263160
5 (E)	BETWEEN BATTLE POSITIONS 8 AND 13 NEAR RIVER	21SWK0384564868
6 (F)	EAST OF BATTLE POSITION 18	21SVK9485468909
7 (G)	2KM SOUTH OF BATTLE POSITION 20	21SVK9888969843
8 (H)	3KM SOUTH OF BATTLE POSITION 26 NEAR JUNCTION OF RIVERS	21SVK9509072244
9 (I)	BETWEEN BATTLE POSITIONS 25 AND 32 NEAR RIVER	21SVK9090177934
10 (J)	WEST OF BATTLE POSITION 34	21SVK8784980894

Figure 7-52. Forward Arming and Refueling Point (FARP) Control Page Display

at any time by the instructor (e.g., while the CC CRT page is displayed, keying in 29 TAB 01 ENTER causes the FARP to be located at FARP site 01).

c. The FARP control page can also be used to position and or reposition the FARP during training periods.

7-50. ENGAGEMENT PERFORMANCE. The engagement performance pages 595A through F and 596A through F (figure 7-53) summarize the twelve most recent target engagements by tither trainee with any of the aircraft weapons systems. An engagement consists of one missile launch, one burst of cannon fire, or all rockets released in one trigger pull.

a. The engagement performance page provides the instructor with feedback on pilot and CPG trainee performance during target engagements. (Table 7-11 lists and explains the data elements that art recorded automatically and summarized on the CRT page during all engagements.)

b. The engagement performance page is in group 5 (TARGETS) and can be accessed via the data entry keyboard by keying in 595 DISPL or 596 DISPL. The data presented permits the instructor to analyze trainee performance using objective data that is not normally available during conventional weapons systems training. The engagement performance information on CRT pages 595 and 596 can be preserved for future reference by using the hardcopy feature.

c. The engagement performance page is used by the instructor to analyze trainee performance when engaging threat targets; to provide the instructor with feedback related to trainee performance; and to debrief/critique trainees after the training period.

7-51. THREAT SCORING. The threat scoring page (figure 7-54) summarizes the threat during the four most recent target engagements by either trainee with any of the aircraft weapons systems. An engagement consists of one missile launch, one burst of cannon fire, or all rockets released in one trigger pull. Threat scoring pages 594A, 594B, and 594C summarize four target engagements each for a total of 12 engagements or events. Since the three pages art identical in content, only one is illustrated.

a. The threat scoring pages provide the instructor with feedback on the threat to the aircraft during target engagements. (Table 7-12 lists and explains the data elements that art recorded automatically and summarized on the CRT page during all engagements.)

b. The threat scoring pages are in group 5 (TARGETS) and can be accessed via the data entry keyboard by keying in 594 DISPL. Use page-forward to review pages 594B, 594C, or 594D. The data presented permits the instructor to analyze trainee performance using objective data that is not normally available during conventional weapons systems training. The threat scoring information on CRT page 594 can be preserved for future reference by using the hardcopy feature.

c. The threat scoring pages art used by the instructor to analyze trainee performance when engaging threat targets; to provide the instructor with feedback related to trainee performance and threat to the aircraft; and to debrief/critique trainees after the training period.

```
MET   03:15:48   INTEG  2
AMI   0  TEE   0  IC  -1
REPLAY:  RECORD    :05:00
FROZEN:

RA          0  ALT    512
AS   0   VS   0   HDG 114
NR  100  TQ1   34  TQ2  35

ROCKET-P- NORM-C- NORM   0
GUN   -P- FXD -C- NORM- 320
MISSLE-P- ON  -C- ON  -  8
P-110.000-108.000-0.000
C-110.000-110.000
STUDENT    0    EVENT    0

500      TARGET INDEX

501-520 TEE SETS

530      TARGET STATUS
531      TARGET TYPE LIST
532-535 TARGET SITE LIST
540      TGT SITE OVERVW
541-574 BAT POS TGT SITE

580      TARGET CONTROL
581      VISIONICS POINT-
         ING/REMOTE DESIG
582      REMOTE DESIG
583      TARGET EVAL

590      WEAPONS LOADING
591      ROCKET CONFIG
592      FARP CONTROL
593      THRT SCRNG GRPH
594      THREAT SCORING
595-596 OWNSHP ENGA PRFM
597      OWNSHP WPN SCRNG
```

```
:00:00                      UNCLASSIFIED                      PAGE 595A
                   OWNSHIP ENGAGEMENT PERFORMANCE

                        GENERAL INFORMATION

ENGAGEMENT NUMBER                          0              0
LOS START TIME                      00:00:00       00:00:00
WEAPONS FIRE TIME                   00:00:00       00:00:00
TOTAL EVENT TIME                    00:00:00       00:00:00
CREW MEMBER:
WEAPON MODE
TARGET SITE                                0              0
TARGET TYPE
TARGET STATUS
TARGET RANGE                             0.0            0.0
LOS/DESIGNATION SOURCE
PITCH RATE                               0.0            0.0
YAW RATE                                 0.0            0.0
TOF                                 00:00:00       00:00:00
DESPOSITION

                           MISSILE DATA

MISS DISTANCE BEST
                    LEFT/RIGHT           0.0            0.0
                    SHORT/LONG           0.0            0.0
DESG ON/OFF TARGET TIME                 0 /0           0 /0
DESG DELAY TIME                            0              0
IMPROPER OFFSET TIME                       0              0
SEEKER ON/OFF TGT TIME                  0 /0           0 /0
LAUNCH/REMOTE DESG ANGLE         0.00/ 0.00     0.00/ 0.00
VISIBILITY                        0      /       0      /
DESG/SEEKER OBSCURED:
  CLOUDS                                0 /0           0 /0
DESG/SEEKER OBSCURED:
  SMOKE/DUST                            0 /0           0 /0
MASK INTERCEPTION: HORZ/VERT        0/     0       0/     0
DESG CONSISTENCY/MODE              0.00/          0.00/
MISSILE SEEKER CODE
LRF/D CODE
REMOTE CODE
                           UNCLASSIFIED
```

Figure 7-53. Ownship Engagement Performance Page Display (Sheet 1)

```
MET   03:22:53    INTEG   2
AMI     0  TEE    0  IC   -1
REPLAY:  RECORD       :05:00
FROZEN:

RA            0  ALT     512
AS   0    VS   0     HDG 114
NR  100  TQ1    34  TQ2   35

ROCKET-P- NORM-C- NORM      0
GUN    -P- FXD -C- NORM-  320
MISSLE-P- ON  -C- ON  -     8
P-110.000-108.000-0.000
C-110.000-110.000
STUDENT     0     EVENT    0

500      TARGET INDEX

501-520 TEE SETS

530      TARGET STATUS
531      TARGET TYPE LIST
532-535 TARGET SITE LIST
540      TGT SITE OVERVW
541-574 BAT POS TGT SITE

580      TARGET CONTROL
581      VISIONICS POINT-
          ING/REMOTE DESIG
582      REMOTE DESIG
583      TARGET EVAL

590      WEAPONS LOADING
591      ROCKET CONFIG
592      FARP CONTROL
593      THRT SCRNG GRPH
594      THREAT SCORING
595-596 OWNSHP ENGA PRFM
597      OWNSHP WPN SCRNG
```

:00:00 UNCLASSIFIED PAGE 596A

OWNSHIP ENGAGEMENT PERFORMANCE

GENERAL INFORMATION

ENGAGEMENT NUMBER		0		0
CREW MEMBER				
WEAPON TYPE				
WEAPON MODE				
TARGET SITE		0		0
TARGET TYPE				
TARGET RANGE		0.0		0.0
LOS/DESIGNATION SOURCE				
ROUNDS FIRED		0		0
DISPOSITION				

GUN/ROCKET DATA

MISS DISTANCE BEST:					
	LEFT/RIGHT	0.0		0.0	
	SHORT/LONG	0.0		0.0	
	LOW/HIGH	0.0		0.0	
MISS DISTANCE WORST:					
	LEFT/RIGHT	0.0		0.0	
	SHORT/LONG	0.0		0.0	
	LOW/HIGH	0.0		0.0	
MISS DISTANCE AVERAGE:					
	LEFT/RIGHT	0.0		0.0	
	SHORT/LONG	0.0		0.0	
	LOW/HIGH	0.0		0.0	
MISS DISTANCE COMPONENT RNG					
	LEFT/RIGHT	0.0/	0.0	0.0/	0.0
	SHORT/LONG	0.0/	0.0	0.0/	0.0
	LOW/HIGH	0.0/	0.0	0.0/	0.0
STANDARD DEVIATION:					
	LEFT/RIGHT	0.00		0.00	
	SHORT/LONG	0.00		0.00	
	LOW/HIGH	0.00		0.00	
SIGHTING ERRORS:					
	AZIMUTH	0.00		0.00	
	ELEVATION	0.00		0.00	

UNCLASSIFIED

Figure 7-53. Ownship Engagement Performance Page Display (Sheet 2)

```
MET 00:00:39   INDEP   5
AMI   0  TEE  0  IC    1
REPLAY: RECORD   :00:39
FROZEN:
- - - - - - - - - - - - -
RA         0  ALT    512
AS   0  VS    0 HDG   19
NR 100 T01   16 T02   19
- - - - - - - - - - - - -

- - - - - - - - - - - - -
ROCKET-P-OFF -C-NORM-  30
GUN   -P-OFF -C-FXD -1200
MISSLE-P-OFF -C-ON  -   8
- - - - - - - - - - - - -
P-  0.000-100.000-225.000
C-  0.000- 32.250
STUDENT    0    EVENT  0
- - - - - - - - - - - - -

500  TARGET INDEX

501-520  TEE SETS

530  TARGET STATUS
531  TARGET TYPE LIST
532-535  TARGET SITE LIST
540  TARGET SITES
     OVERVIEW
541-574  BATTLE POSITION
         TARGET SITES

580  TARGET CONTROL
581  VISIONICS POINTING/
     REMOTE DESIG
582  TARGET EVAL

590  WEAPONS LOADING
591  ROCKET CONFIG
592  FARP CONTROL
593  ENGAGEMENT PERFORMANCE
594  THREAT SCORING
```

:00:00 THREAT SCORING PAGE 594A

EVENT NUMBER	0	0	0	0
TARGET TYPE				
TARGET SITE NUMBER	0	0	0	0
EVENT START TIME	00:00:00	00:00:00	00:00:00	00:00:00
EVENT END TIME	00:00:00	00:00:00	00:00:00	00:00:0
EVENT EXPOSURE TIME	00:00:00	00:00:00	00:00:00	00:00:00
TOTAL EXPOSURE TIME	00:00:00	00:00:00	00:00:00	00:00:00
EXPOSURE ZONE (MAX)	0	0	0	0
EXPOSURE ZONE (MEAN)	0	0	0	0
EXPOSURE ZONE (FINAL)	0	0	0	0
(LO: 0 , HI: 5)				
FINAL RANGE (M)	0	0	0	0
VISIBILITY (M)	0	0	0	0
BACKDROP UTILIZATION (%)	0	0	0	0
ASE UTILIZATION				
MIN ROD PA/PH	0.00	0.00	0.00	0.00
PA (MAX)	0.00	0.00	0.00	0.00
PA (MEAN)	0.00	0.00	0.00	0.00
PA (FINAL)	0.00	0.00	0.00	0.00
PH (MAX)	0.00	0.00	0.00	0.00
PH (MEAN)	0.00	0.00	0.00	0.00
PH (FINAL)	0.00	0.00	0.00	0.00
DISPOSITION				
HIT OVRD	ON	ON	ON	ON
HOSTILITY	OFF	OFF	OFF	OFF
ROUNDS REMAINING	0	0	0	0
OWNSHIP ENGAGEMENTS	0	0	0	0
CUM OWNSHIP ENGAGEMENTS	0	0	0	0
TARGETS DESTROYED	0	0	0	0
CUM TARGETS DESTROYED	0	0	0	0

(PAGE FORWARD FOR CONTINUATION)

Figure 7-54. Threat Scoring Page Display

Table 7-11. Engagement Performance Page Data Display

Item	Data
	Guns and Rockets
ENGAGEMENT NUMBER	Number given to the engagement (1-999), only the 12 most recent are displayed.
CREWMEMBER	Crew member delivering the weapon, PLT or CPG.
WEAPONS TYPE	Rockets or 30mm gun.
WEAPON MODE	Mode in which weapon was released: GUN-NORM, FIXED; ROCKET-NORM, GROUND STOW, FLIGHT STOW, COOPERATIVE, IMPROPER COOP.
TARGET SITE	No. between 1 and 99 from target sites list CRT pages 532 through 535.
TARGET TYPE	No. 1-48 from target type list CRT pages 531A-C.
TARGET RANGE	Distance from ownship to target in meters at time of weapon release.
LOS/DESIGNATION SOURCE	Aiming or designation method used. Results Include the following: TADS, CPG IHADSS, PLT IHADSS, Remote, Autonomous, both, none.
ROUNDS FIRED	Total rounds fired at target during a single engagement.
DISPOSITION	HIT or MISS or KILL
MISS DISTANCE BEST: LEFT/RIGHT, SHORT/LONG, LOW/HIGH	The resultant distance, in meters, at which the closest impact point occurs, broken down into it's individual dimensions.
MISS DISTANCE WORST: LEFT/RIGHT, SHORT/LONG LOW/HIGH	The resultant distance, in meters, at which the furthest impact point occurs, broken down into it's individual dimensions.
MISS DISTANCE AVERAGE: LEFT/RIGHT, SHORT/LONG, LOW/HIGH	The average of all the resultant impact distances broken down Into it's individual dimensions.
MISS DIST COMPONENT RNG: LEFT/RIGHT, SHORT/LONG, LOW/HIGH	The miss distance range spread, in meters, of all the impact points in the individual dimensions.
STANDARD DEVIATION: LEFT/RIGHT, SHORT/LONG, LOW/HIGH	The standard deviation of miss distance range spreads in the individual dimensions.

Table 7-11. Engagement Performance Page Data Display - Continued

Item	Data
	Guns and Rockets - continued
SIGHTING ERRORS: AZIMUTH, ELEVATION	The deviation between the azimuth and elevation of the sighting path and the ownship to target LOS vector.
	Missiles
ENGAGEMENT NUMBER	Number given to the engagement (l-999) only the 12 most recent are displayed.
LOS START TIME	Time, hr:min:sec, at which LOS was first obtained between the target and ownship.
WEAPONS FIRE TIME	Time, hr:min:sec, at which the weapon was fired.
TOTAL EVENT TIME	Total time, In hr:min:sec, recorded from start of LOS to weapon fire time.
CREW MEMBER	PLT or CPG
WEAPON MODE	Mode in which missile was released: LOBL, LOAL-DIR, LOAL-LO, LOAL-HI, with either NORM, RIPL or HAN.
TARGET SITE	No. between 1 and 99 from target sites list CRT pages 532 through 535.
TARGET TYPE	No. 1-48 from target type list CRT pages 531A-C
TARGET STATUS	Disposition of target at weapon fire time with respect to LOS, Hostility, Motion, Destroyed status (L,H,M, and K respectively).
TARGET RANGE	Slant range from ownship to target, in meters, at weapon fire time.
LOS/DESIGNATION SOURCE	Source of designation laser, either ownship or remote designator.
PITCH RATE	Rate of change, in deg/sec, of ownship pitch at weapon fire time.
YAW RATE	Rate of change, in deg/sec, of ownship yaw at weapon fire time.
TOF	Weapon Time of Flight measured from weapons fire time to impact of missile.

Table 7-11. Engagement Performance Page Data Display - Continued

Item	Data
	Missiles - continued
DISPOSITION	Hit or Miss
MISS DISTANCE BEST: LEFT/RIGHT, SHORT/LONG	The resultant distance, in meters, at which the closest impact point occurs, broken down Into it's individual dimensions.
DES ON/OFF TARGET TIME	The amount of time the ownship laser was on or off the target.
DES DELAY TIME	Time delay between missile launch and the ownship lasing the target.*
IMPROPER OFFSET TIME	Amount or time (in critical window) that the ownship was not lasing on the target.*
SEEKER ON/OFF TARGET TIME	The time the seeker sees the target, based on the seeker tracking the designation laser spot and the spot is on the target.*
LAUNCH/REMOTE DES ANGLE	Launch : Angle between seeker (on Rail) and target at weapon fire time.* Remote : Splash angle of remote designator on the target.*
VISIBILITY	Entered visibility at missile fire time.*
DES/SEEKER OBSCURED: CLOUDS, SMOKE/DUST	The time, in seconds, that the designator and/or seeker were obscured from the target by one or more of the obscuration items listed during the entire flight of the missile.*
MASK INTERCEPTION: HORZ/VERT	Record of seeker intersection with mask at any time during the missile flight.*
DES CONSISTENCY/MODE	Standard deviation of the designation point variances during the Critical Illumination Period (CIP) of the missile flight.*
MISSILE SEEKER CODE	Seeker code to assigned to missile fired in current engagement.*
LRF/D Code	Code assigned to ownship's laser designator during the current engagement.*
REMOTE CODE	Code assigned to remote designator during current engagement.*

*Indicates item is a "tolerance" item. When the value of these fields exceeds allowable limits an asterisk (*) is placed next to the field on the CRT page.

Table 7-12. Threat Scoring Page Data Display

Item	Data
EVENT NUMBER	Defines which particular event that has occurred; as each event occurs, events scroll right with latest event displayed in left-lost column of CRT page 594A
TARGET TYPE	Target that caused the end of an event (there are 16 target types)
TARGET SITE NUMBER	Target site that was being used during event recorded (site number range is 0 - 99)
EVENT START TIME	Specific time that event started; this is associated with MET
EVENT END TIME	Specific time that event ended; this is associated with MET
EVENT EXPOSURE TIME	Length of time that event lasted; this is the difference between event start and end times

Table 7-12. Threat Scoring Page Data Display - Continued

Item	Data
TOTAL EXPOSURE TIME	Length of time that target was in line-of-sight of ownship; time is accumulated over each event until ownship breaks line-of-sight for greater than 5 seconds, in which case total exposure time is reset to 0
EXPOSURE ZONE (MAX)	Maximum unmasked area that ownship was in during event (value range is 0 - 5)
EXPOSURE ZONE (MEAN)	Average unmasked area that ownship was in during event (value range is 0 - 5)
EXPOSURE ZONE (FINAL)	Last unmasked area that ownship was in at time event ended (value range is 0 - 5)
FINAL RANGE (M)	Distance in meters between target and own-ship at time event ended
VISIBILITY (M)	Maximum distance in meters that ownship can visually obtain an object
BACKDROP UTILIZATION	Percentage of backdrop that was used over a particular time during event (value range is 0 - 100)
ASE UTILIZATION	Defines aircraft servicability equipment that was used effectively against a threat during event (parameters used are RDR,IR,and CF)
PA (MAX)	Maximum probability of being acquired that ownship obtained during event (value range is 0.00 - 1.00)
PA (MEAN)	Average probability of being acquired that ownship obtained during event (value range is 0.00 - 1.00)
PA (FINAL)	Final probability of being acquired that ownship obtained at time event ended (value range is 0.00 - 1.00)
PH (MAX)	Maximum probability of being hit that own-ship obtained during event (value range is 0.00 - 1.00)
PH (MEAN)	Average probability of being hit that own-ship obtained during event (value range is 0.00 - 1.00)

Table 7-12. Threat Scoring Page Data Display - Continued

Item	Data
PH (FINAL)	Final probability of being hit that ownship obtained at time event ended (value range is 0.00 - 1.00)
DISPOSITION	Result that occurred at end of event (parameters used are HIT, MISS, and blank)
HIT OVRD	Defines whether or not a malfunction will be executed when ownship takes ahit from a threat (parameter is ON or OFF)
HOSTILITY	Defines whether or not a target is a threat to the ownship during event (parameters are ON or OFF)
ROUNDS REMAINING	Number of rounds that threat has left at time event ended
OWNSHIP ENGAGEMENTS	Number of times that ownship fired a weapon at any target during event: number is tallied against all targets fired upon regardless of which target caused end of event
CUM OWNSHIP ENGAGEMENTS	Total number of times that ownship fired a weapon at any target, accumulated over all events
TARGETS DESTROYED	Number of targets destroyed during event
CUM TGTS DESTROYED	Total number of targets destroyed, accumulated over all events

7-52. AUTOMATIC MALFUNCTION INSERTION. Automatic malfunction insertion (AMI) (figure 7-55) automatically inserts malfunctions or systems failures of simulated aircraft components in response to preprogrammed conditions expected to occur during an instructional activity. These contingent conditions/parameters include:

No. 1 engine rpm - %
No. 2 engine rpm -- %
Altitude - feet MSL
Altitude - feet AGL
Indicated airspeed - knots
Weapons release - seconds after
Mission elapsed time - minutes
Previous malfunction occurrence

a. There are 15 sets of AMI programs available, with up to 10 malfunctions programmed for each one. Up to three different contingent conditions/parameters can be designated for each malfunction. The contingent conditions/parameters can be programed so all must occur or any one of the designated set can trigger the malfunction. For example, one malfunction in an AMI set could be: engine No. 1 fails when altitude is greater than 30 feet AGL, airspeed is less than 10 knots, and mission elapsed time is equal to 30 minutes. When the specified insertion contingencies have been met. the malfunction occurs in the manner programmed for it without instructor intervention.

b. Since the insertion of specific malfunctions are controlled automatically and are triggered by conditions that may be beyond Instructor control and their occurrence may disrupt training or overload a trainee at that point, the instructor receives an alert message. Ten seconds prior to insertion of an AMI malfunction. an alert message with the name of the malfunction is displayed in the IOS CRT alert area. The instructor has the option at this time to allow the malfunction insertion and to monitor trainee response, or to delete it. If the instructor chooses to delete the malfunction during the 10-second alert period, the MALF OVERRIDE switchlight on the forward control panel must be depressed. Depressing the switchlight deletes the impending malfunction for the remainder of the training period without affecting the remainder of the malfunctions in the AMI set. Once an automatic malfunction has been overridden (deleted), the instructor can insert it manually via the data entry keyboard and the manual malfunctions pages.

c. The instructor can remove any automatically inserted malfunction from the simulation by keying in the unique 5-digit identifier associated with that malfunction and ENTER on the data entry keyboard. Alternatively, all active malfunctions can be removed from the simulation by depressing the REMOVE ACTIVE MALFS switchlight on the forward control panel.

d. AMI sets are called up for CRT display and/or activated via the data entry keyboard on the console control panel. AMI sets are in group 2 (MALFUNCTION INDEX) and are listed on CRT pages 201 through 215. An AMI set can be displayed on the main page of the CRT by depressing the 3-digit unique page number and DISPL on the keyboard (e.g., AMI set number 5 is on CRT page 205). The AMI set can be entered into the simulation when it is currently displayed on the CRT by keying in the 3-digit page number and ENTER on the keyboard. Alternatively, an AMI set can be directly entered without displaying it on the CRT by keying in the 3-digit page number and depressing ENTER. The simulator does not have to be in freeze condition to enter any AMI. Only one AMI set can be active at a time. Selection of subsequent AMI sets during a period automatically deletes the previously selected set.

e. The HALF OVERRIDE switchlight for deleting automatic insertion of malfunctions and the REMOVE ACTIVE MALFS switchlight for deleting all active malfunctions are at the top left on the IOS forward control panel. These switchlights are used to relieve instructor workload, permit skilled pilots to practice emergency procedures independently, and provide a greater degree of standardization.

```
MET 00:00:00   INDEP  5
AMI   0  TEE   0  IC  -2
REPLAY:   RECORD   :00:00
FROZEN:
- - - - - - - - - - - - - -
RA         0  ALT     512
AS   0  VS    0 HDG   274
NR 100 T01    18 T02   18
- - - - - - - - - - - - - -

- - - - - - - - - - - - - -
ROCKET-P-OFF -C-NORM-   0
GUN   -P-OFF -C-NORM-   0
MISSLE-P-OFF -C-ON  -   0
- - - - - - - - - - - - - -
P-  0.000-100.000-225.000
C-  0.000-110.000
STUDENT    0    EVENT  0
- - - - - - - - - - - - - -

200      MALF INDEX

201-215 AMI SETS
221     APU/FUEL
222     ENG INST/ENV CTL
223     ENG SYSTEMS
224     FLT CTL/ASE/STAB
225     TRANS/ROTOR
226     ELEC/HYDRAULIC
227-230 CIRCUIT BREAKERS
231     FLIGHT/COMM/NAV
232     MISSION AVIONICS
233     WEAPONS/ASE

234     CATASTROPHIC
```

```
:00:00                                                       PAGE   201
                     AUTOMATIC MALFUNCTION INSERTION

SET NO. 1

MALF  22201  #1 NG IND 0                     MALF
  RPM EMG #1 (%)    > 50


MALF  22306  #2 HANG START                   MALF
  RPM EMG #2 (%)    > 60     OR
  ALTITUDE AGL (F) < 2000


MALF  22324  #1 LOSS OF OIL                  MALF
  AIRSPEED (KIAS)  < 100  AND
  MISSION TIME (S) = 20   AND
  RPM ENG #2 (%)   > 65


MALF
                                        99 CANCEL AMI

MALF


MALF


MALF
```

Figure 7-55. Automatic Malfunction Insertion Page Display

NOTE

> The AMI should not be used to introduce pilots to malfunctions or in conjunction with other training activities for relatively unskilled pilots. Manual insertion of malfunctions should be used for introduction. (Refer to MANUAL MALFUNCTIONS.) AMI's may Increase the trainee task loading; as such, they should be used for advanced or continuation training activities and for training pilots in maintenance of skills.

7-53. MANUAL MALFUNCTION. Malfunction simulation (MS) enables the instructor to fail, partially or totally, a simulated aircraft component or to introduce an abnormal aircraft condition. When such a failure is inserted into the simulation, the consequences duplicate the consequences of a corresponding failure in the aircraft. Actions taken by the trainee in the simulator following insertion of a failure have the same consequences as would be experienced under corresponding circumstances in the aircraft. The instructor can insert or remove a simulated malfunction, but cannot change its programmed characteristic.

a. Malfunction simulation enables the instructor to simulate the occurrence of component malfunctions and failures so that the pilot and/or copilot/gunner can be trained to determine that an abnormal condition has occurred, identify the condition, and take the prescribed corrective or compensating action. Since the simulator provides a safe environment in which such training can take place, it provides the only environment in which training associated with the most hazardous malfunctions can take place. Approximately 336 malfunctions are available in the CMS. (Refer to tables 7-15 and 7-16, in Section IV of this chapter.)

b. Malfunctions are entered into the simulation through the data entry keyboard on the console control panel at each IOS. Categories of available malfunctions are indexed by system on CRT page 200 (figure 7-56). Individual malfunctions are coded with a specific 5-digit identifier made up of the number of the CRT page on which it appears (3 digits) and the line number (2 digits) on that CRT page. (See figure 7-57.) Typing the 5-digit identifier and depressing ENTER on the keyboard inserts the malfunction into the simulation (e.g., typing 22102 ENTER inserts the malfunction appearing on line 02 of CRT page 221). Once inserted, the malfunction can be removed by reentering its identifier. Up to 15 malfunctions can be active at any one time, and up to six of these are displayed in the status area of the IOS CRT display. Active malfunctions can also be removed from the simulation by depressing the REMOVE ACTIVE MALFS switchlight on the forward control panel.

c. Instructors can use the malfunction simulation function to provide the trainee with exposure to, and practice in dealing with, possible aircraft in-flight emergencies and aircraft systems malfunctions.

7-54. DEMONSTRATIONS. Demonstrations (DEMOS) consist of a prerecorded aircraft maneuver or a series of aircraft maneuvers that provide a model for the desired performance of the maneuver being demonstrated. During demos, instruments, indicators, aircraft flight controls, motion system movements, visual display scenes, and associated aircraft sounds reflect an idealized performance of the maneuver as flown by an expert. Demos include audio briefings, explanations. and instructional commentary to facilitate trainees subsequent performance of the maneuver.

```
MET  00:00:00    INDEP  5
AMI    0  TEE   0  IC  -2
REPLAY:   RECORD    :00:00
FROZEN:
- - - - - - - - - - - - - -
RA          0  ALT      512
AS   0  VS     0  HDG   274
NR 100  T01   18  T02    18
- - - - - - - - - - - - - -

- - - - - - - - - - - - - -
ROCKET-P-OFF -C-NORM-    0
GUN   -P-OFF -C-NORM-    0
MISSLE-P-OFF -C-ON   -   0
- - - - - - - - - - - - - -
P-  0.000-100.000-225.000
C-  0.000-110.000
STUDENT    0    EVENT   0
- - - - - - - - - - - - - -
0          INDEX

DISP    SUBJECT          PAGE

1  INIT/CURR COND        100
2  MALFUNCTIONS          200
3  GRAPHICS              300
4  DEMOS/AF/RP           400
5  TARGETS               500
6  NAV/COMM              600
7  700 SERIES INDEX      700
8  800 SERIES INDEX      800
9  PREP & TEST           900
```

```
:00:00                                        PAGE   200A

                     MALFUNCTION INDEX

  AUTO MALFUNCTION SETS

     201
     202
     203
     204
     205
     206
     207
     208
     209
     210
     211
     212
     213
     214
     215

                 PAGE FORWARD FOR CONTINUATION
```

Figure 7-56. Malfunction Index Page Display (Sheet 1)

```
MET  00:00:00   INDEP   5
AMI    0  TEE   0  IC   1
REPLAY:   RECORD   :00:00
FROZEN:

RA          0  ALT     512
AS   0  VS     0 HDG    19
NR 100 T01    18 T02    17

ROCKET-P-OFF -C-NORM-  38
GUN   -P-OFF -C-FXD -1200
MISSLE-P-OFF -C-ON  -   8

P-  0.000-108.000-225.000
C-  0.000- 32.700
STUDENT    0    EVENT  0

200      MALF INDEX

201-215  AMI SETS
221      APU/FUEL
222      ENG INSTRUMENTS
223      ENG SYSTEMS
224      HYD/FLT CONTROL
225      TRANS/ROTOR
226      ELECTRICAL
227-230  CIRCUIT BREAKERS
231      FLIGHT/NAV/COMMS
232      MISSION AVIONICS
233      WEAPONS/ASE
234      CATASTROPHIC MALF
```

```
:00:00                                        PAGE   200B

                     MALFUNCTION INDEX

      221  AUXILIARY POWER UNIT/FUEL

      222  ENGINE INSTRUMENTS

      223  ENGINE SYSTEMS

      224  HYDRAULIC/FLIGHT CONTROL

      225  TRANSMISSION/ROTOR

      226  ELECTRICAL

      227-230  CIRCUIT BREAKERS

      231  FLIGHT INSTRUMENTS/NAVIGATION
           COMMUNICATION

      232  MISSION AVIONICS

      233  WEAPONS/AIRCRAFT
           SURVIVABILITY EQUIPMENT

      234  CATASTROPHIC MALF PAGE
```

Figure 7-56. Malfunction Index Page Display (Sheet 2)

MET 00:00:00 INDEP 5
AMI 0 TEE 0 IC 1
REPLAY: RECORD :00:00

RA 0 ALT 512
AS -5 VS 0 HDG 19
NR 100 T01 18 T02 17

ROCKET-P-OFF -C-NORM- 38
GUN -P-OFF -C-FXD -1200
MISSLE-P-OFF -C-ON - 8

P- 0.000-108.000-225.000
C- 0.000- 32.700
STUDENT 0 EVENT 0

200 MALF INDEX

201-215 AMI SETS
221 APU/FUEL
222 ENG INSTRUMENTS
223 ENG SYSTEMS
224 HYD/FLT CONTROL
225 TRANS/ROTOR
226 ELECTRICAL
227-230 CIRCUIT BREAKERS
231 FLIGHT/NAV/COMMS
232 MISSION AVIONICS
233 WEAPONS/ASE
234 CATASTROPHIC MALF

:00:00

PAGE 221

AUXILIARY POWER UNIT/FUEL SYSTEM MALFUNCTIONS

AUXILIARY POWER UNIT

01 APU FAIL AT STRT
02 APU HANG START
03 APU CNTLR,NG>107
04 APU FIRE

FUEL SYSTEM

05 FUEL BOOST PUMP
06 FUEL XFER PUMP
07 FUEL QTY UNBAL
08 FUEL CROSSFEED
09 FUEL CONTAMINATE
10 PLT FUEL QTY IND
11 #1 FUEL FTR CLOG
12 #2 FUEL FTR CLOG

Figure 7-57. Typical Malfunctions Page Display

a. Most trainees can read the performance requirements for a maneuver or procedure, and with sone verbal assistance from an instructor, execute the maneuver. Occasionally, because of the complexity of a maneuver or because of the need for precise performance timing, the instructor provides a demonstration of the maneuver prior to trainee execution and practice. In dual-controlled aircraft, an instructor simply takes control of the aircraft and provides the required demonstration. In the CMS, this instructor function has been automated to save time and to standardize instruction. The automated demonstrations in the CMS are generally short, and can be played in either real-time or in slow-time. In slow-time, there is no audio, and the instructor must provide any required commentary.

b. The demos are in group 4 (DEMOS/AF/RP) and are accessed via the data entry keyboard by keying in 400 DISPL. (See INDEX area, figure 7-58, and DEMO INDEX, figure 7-59). The demos are on CRT pages 401 through 420. (See figure 7-60).

c. The REPLAY AUDIO OFF and the REPLAY SLOW TIME switchlights on the forward control panel can be used to turn off the synchronized audio comnentary and start and stop slow-time, respectively.

d. Demo programs can be displayed at the IOS for review prior to entry during the selection process, or they can be entered directly into the simulation without displaying them. They can be initiated from the beginning of the program, or they can be initiated from an intermediate segment of a program. (For direct entry without display, the demo/segment number should be determined during premission planning.) The following methods and procedures can be used to select, display, enter, and activate demos:

(1) To call up a demo page (figure 7-60) for review or entry, proceed as follows:

(a) Key in 400 DISPL to display demo index in CRT main page area.

(b) Select 3-digit set number and DISPL (e.g.. to display demo set No. 6, which is on CRT page 406, key in 406 DISPL).

(c) DISPL permits reviewing demo content prior to entering. To enter a demo that is currently displayed, key in 01 TAR (1-10) ENTER.

(d) After ENTER. demo is ready for activation when PROB FREEZE switchlight stops flashing.

(2) Demos can contain up to ten segments. Generally, each segment is a complete maneuver or series of maneuvers. Each segment is individually numbered and addressable. The demo can be initiated from an intermediate segment by either of the following:

```
MET  00:01:16   INDEP  5
AMI    0  TEE   0  IC  1
REPLAY:   RECORD   :01:18
FROZEN:
- - - - - - - - - - - - - -
RA        30  ALT     752
AS  73  VS -459 HDG  261
NR  99 T01   25 T02   25
- - - - - - - - - - - - - -

- - - - - - - - - - - - - -
ROCKET-P-OFF -C-NORM-   0
GUN   -P-OFF -C-NORM    0
MISSLE-P-OFF -C-ON  -   0
- - - - - - - - - - - - - -
P-  0.000-120.000-225.000
C-  0.000- 40.500
STUDENT   0    EVENT  0
- - - - - - - - - - - - - -
0        INDEX
DISP  SUBJECT          PAGE
1  INIT/CURR COND      100
2  MALFUNCTIONS        200
3  GRAPHICS            300
4  DEMOS/AF/RP         400
5  TARGETS             500
6  NAV/COMM            600
7  700 SERIES INDEX    700
8  800 SERIES INDEX    800
9  PREP & TEST         900
```

```
:00:00                                              PAGE   400A

                DEMOS/AUTOFLY/RECORD PLAYBACK INDEX

  DEMONSTRATIONS
     401
     402
     403
     404
     405

     406
     407
     408
     409
     410

     411
     412
     413
     414
     415

                  (PAGE FORWARD FOR CONTINUATION)
```

Figure 7-58. Demos/Autofly/Record Playback Index Page 400A Display

```
MET  00:01:18   INDEP  5
AMI    0  TEE   0  IC  1
REPLAY:   RECORD   :01:18
FROZEN:
- - - - - - - - - - - - - -
RA        30  ALT     752
AS  73  VS -459 HDG  261
NR  99 T01   25 T02   25
- - - - - - - - - - - - - -

- - - - - - - - - - - - - -
ROCKET-P-OFF -C-NORM-   0
GUN    -P-OFF -C-NORM   0
MISSLE-P-OFF -C-ON  -   0
- - - - - - - - - - - - - -
P-  0.000-120.000-225.000
C-  0.000- 40.500
STUDENT    0    EVENT  0
- - - - - - - - - - - - - -
400      DEMOS/AF/RP
           INDEX
401-420  DEMONSTRATIONS
421-460  AUTOFLYS
470      PLAYBACK
```

```
:00:00                                              PAGE   400B

                 DEMOS/AUTOFLY/RECORD PLAYBACK INDEX

   DEMONSTRATIONS (CONTD)

      416
      417
      418
      419
      420

   AUTOFLY

      421
      422
      423
      424
      425

      426
      427
      428
      429
      430

                 (PAGE FORWARD FOR CONTINUATION)
```

Figure 7-59. Demos/Autofly/Record Playback Index Page 400B Display

```
MET  00:00:00   INTEG   2     :00:00                                                 PAGE   401
AMI     0  TEE  20  IC   1
REPLAY: RECORD   :00:00                         DEMONSTRATION SET NO.      0
FROZEN:
                                                 REPLAY CONFIGURATION:             VISUAL MODE:
- - - - - - - - - - - - - -                   01 SEGMENT TO REPLAY           0
RA        0  ALT     512
AS  -5  VS    0 HDG   19
NR 100 T01   17 T02   17                   SEGMENT 1
- - - - - - - - - - - - - -
                                           SEGMENT 2

                                           SEGMENT 3

- - - - - - - - - - - - - -                SEGMENT 4
ROCKET-P-NORM-C-NORM-  38                  SEGMENT 5
GUN   -P-NORM-C-NORM-1200
MISSLE-P-OFF -C-ON  -   8                  SEGMENT 6
- - - - - - - - - - - - - -
                                           SEGMENT 7
P-  0.000-132.700-247.000
C-  0.000-132.700                          SEGMENT 8
STUDENT    0    EVENT  0
                                           SEGMENT 9
- - - - - - - - - - - - - -
                                           SEGMENT 10
400      DEMOS/AF/RP
           INDEX

401-420  DEMONSTRATIONS

421-460  AUTOFLYS

470      PLAYBACK
```

Figure 7-60. Demonstration Set No. Page Display

(a) With demo page displayed, select segment reference number and enter it via data entry keyboard, using 01 TAB (segment 1-10) ENTER.

(b) If the page is not displayed, identify desired demo and its segment number during premission planning. With simulator in freeze, activate demo segment by keying in demo CRT page number. segment number, and ENTER.

e. Maximum operating time for a demonstration is 5 minutes. At the conclusion of the demo, the simulator enters an automatic freeze. To continue training activities, the instructor can do one of the following:

(1) Enter required 3-digit number to reselect completed demo or any other demo, then enter 01 TAR (segment 1-10) ENTER.

(2) Enter required 3-digit number to select a new set of IC's and, when PROB FREEZE switchlight stops flashing, continue training from that point.

f. Resume or flyout functions can be employed at any time during a demonstration by activating PROB FREEZE, then selecting either the REPLAY RESUME or REPLAY FLYOUT switchlight.

(1) Depress REPLAY RESUME switchlight on forward control panel to continue training from the point at which demo was initiated (problem freeze condition prior to start of demo). When PROB FREEZE switchlight stops flashing, depress PROB FREEZE switchlight to permit training to continue from that point.

(2) Depress REPLAY FLYOUT switchlight on forward control panel to continue training from the point at which the demo terminates. Then, depress PROB FREEZE switchlight to permit training to continue from that point.

g. Demonstrations are used to:

(1) Supplement, or substitute for, a demonstration flown by the instructor.

(2) Provide an idealized, standardized model of maneuver performance in real- or slow-time.

(3) Present a standardized description of a maneuver or procedure, including relationships between relevant controls and indicators, the performance standard associated with the maneuver or procedure, and other instructional information.

7-55. AUTOFLY. When the CPG cockpit is operated in the independent mode, there is in effect no pilot to fly the aircraft. To compensate for the missing pilot, automatic flight (AUTOFLY) flies the aircraft for the CPG. The autofly feature flies through a prerecorded aircraft maneuver or series of contiguous maneuvers. When an autofly set is active. all CPG cockpit instrument and indicator activations, motion system movements, visual display scenes, and mechanical and aerodynamic sounds occur. The CPG trainee has full access to and control over all sighting, sensor, and weapons systems normally available in that cockpit. At predetermined points within the autofly set, usually firing positions, the instructor can interrupt the flight and assume manual control of the simulated aircraft heading and altitude.

This allows the trainee additional time, if needed, to operate sighting, sensor, and weapon systems.

a. The autofly sets are in group 4 (DEMOS/AF/RP) and are accessed via the data entry keyboard by keying in 400 DISPL and PAGE FWD to CRT page 400B or PAGE FWD again to 400C to view the autofly index. The autofly sets are on CRT pages 421 through 460. (See figures 7-59 and 7-61 through 7-63.)

b. Autofly programs can be displayed at the IOS for review prior to entry during the selection process, or they can be entered directly into the simulation without displaying them. They can be initiated from the beginning of the program, or they can be initiated from an intermediate segment of a program. (For direct entry without display, the set/segment number should be determined during premission planning). The following methods and procedures can be used to select, display, enter, and activate autofly programs:

(1) To call up an autofly set page (figure 7-63) for review or entry, proceed as follows:

(a) Key in 400 DISPL and PAGE FWD to display autofly index in CRT main page area.

(b) Select 3-digit set number and DISPL. (e.g., to display autofly set NO. 5, which is on CRT page 425, key in 425 DISPL). (Simulator must be in freeze to enter autofly programs.)

(c) DISPL permits reviewing autofly content prior to entering. To enter an autofly set that is currently displayed, key in 01 TAB (segment 1-10) ENTER.

(d) After ENTER, autofly is ready for activation when PROB FREEZE switch-light stops flashing.

(2) To activate an autofly set at an intermediate segment rather than the beginning of the set, use either of the procedures below. In general, the intermediate segment is used to permit independent CPG gunnery training, permit independent CPG emergency systems training, and increase the line-of-sight exposure time at selected locations. Proceed as follows:

(a) With autofly set displayed on main page area of CRT, select 2-digit line number adjacent to segment desired and enter it via the data entry keyboard by entering 01 TAB (segment 1-10) ENTER.

```
MET  ØØ:Ø1:18   INDEP  5
AMI    Ø  TEE   Ø  IC   1
REPLAY:   RECORD   :Ø1:18
FROZEN:
- - - - - - - - - - - - - -
RA        3Ø  ALT      752
AS  73  VS -459 HDG  261
NR  99 TØ1   25 TØ2   25
- - - - - - - - - - - - - -

- - - - - - - - - - - - - -
ROCKET-P-OFF -C-NORM-   Ø
GUN   -P-OFF -C-NORM    Ø
MISSLE-P-OFF -C-ON  -   Ø
- - - - - - - - - - - - - -
P-  Ø.ØØØ-128.ØØØ-225.ØØØ
C-  Ø.ØØØ- 4Ø.5ØØ
STUDENT    Ø    EVENT  Ø
- - - - - - - - - - - - - -
4ØØ      DEMOS/AF/RP
           INDEX
4Ø1-42Ø  DEMONSTRATIONS
421-46Ø  AUTOFLYS
47Ø      PLAYBACK
```

```
:ØØ:ØØ                                          PAGE   4ØØC

              DEMOS/AUTOFLY/RECORD PLAYBACK INDEX

   AUTOFLY (CONTD)
      431
      432
      433
      434
      435

      436
      437
      438
      439
      44Ø

      441
      442
      443
      444
      445

             (PAGE FORWARD FOR CONTINUATION)
```

Figure 7-61. Demos/Autofly/Record Playback Index Page 400C Display

```
MET  00:01:18   INDEP   5
AMI    0  TEE   0  IC   1
REPLAY:   RECORD   :01:18
FROZEN:
- - - - - - - - - - - - -
RA        30  ALT     752
AS  73  VS -459 HDG  261
NR  99 T01   25 T02   25
- - - - - - - - - - - - -

- - - - - - - - - - - - -
ROCKET-P-OFF -C-NORM-   0
GUN    -P-OFF -C-NORM   0
MISSLE-P-OFF -C-ON  -   0
- - - - - - - - - - - - -
P-  0.000-128.000-225.000
C-  0.000- 40.500
STUDENT     0    EVENT  0
- - - - - - - - - - - - -
400       DEMOS/AF/RP
            INDEX
401-420   DEMONSTRATIONS
421-460   AUTOFLYS
470       PLAYBACK
```

```
:00:00                                              PAGE   400D

                  DEMOS/AUTOFLY/RECORD PLAYBACK INDEX
  AUTOFLY (CONTD)
      446
      447
      448
      449
      450

      451
      452
      453
      454
      455

      456
      457
      458
      459
      460

      470  PLAYBACK
```

Figure 7-62. Demos/Autofly/Record Playback Index Page 400D Display

```
MET 00:00:39  INTEG  5      :00:00                                              PAGE  421
AMI   0 TEE  0 IC   1
REPLAY:   RECORD   :00:39                          AUTOFLY SET NO.        0
FROZEN:
                                         01 SEGMENT TO REPLAY           0
- - - - - - - - - - - - - -
RA         0  ALT     512          VEHICLE IS NOT IN HOVER CONDITION
AS   0  VS    0 HDG    19
NR 100 T01   16 T02    19       SEGMENT 1   AUTO
                                            FLT 2.  THIS IS A SAMPLE TITLE
- - - - - - - - - - - - - -
                                SEGMENT 2

                                SEGMENT 3

- - - - - - - - - - - - - -     SEGMENT 4   AUTO
ROCKET-P-OFF -C-NORM-  38                   FLT 2.  THIS IS A SAMPLE TITLE
GUN   -P-OFF -C-FXD -1200
MISSLE-P-OFF -C-ON  -   8       SEGMENT 5

- - - - - - - - - - - - - -     SEGMENT 6
P-  0.000-180.000-225.000
C-  0.000- 32.250               SEGMENT 7
STUDENT    0    EVENT  0
                                SEGMENT 8
- - - - - - - - - - - - - -
                                SEGMENT 9
400       DEMOS/AF/RP
            INDEX               SEGMENT 10

401-420   DEMONSTRATIONS

421-460   AUTOFLYS

470       PLAYBACK
```

Figure 7-63. Autofly Set Page Display

(b) Depress PROBLEM FREEZE to initiate autofly program.

c. AUTOFLY sets contain hover points at specific geographic locations that permit the instructor to assume control of altitude and heading during target engagement activities and weapons firing. The instructor can elect to manually control heading and altitude at these hover points to allow the trainee more time to complete firing activities. (Using this feature, the instructor can extend the period during which the aircraft is unmasked beyond that which was originally recorded). The CPG IOS console control panel contains an AUTOFLY CONTROL panel that includes a MAN switchlight for manual control activation and a 4-direction joystick. Depression of the MAN switchlight any time prior to arrival, or while at a preselected hover location, engages the manual control. During manual control, the autofly program is on a temporary hold. Heading corrections can be made by moving the joystick left or right for respective left or right turns. Altitude can be changed by moving the joystick forward for up and backward for down. The simulated aircraft will not descend below the minimum altitude that was recorded for that hover point. When firing activities are completed at that location, depressing the MAN switchlight releases the temporary hold and permits the autofly program to continue as originally recorded.

7-56. RECORD/PLAYBACK. Record/playback permits the replay of recent or immediately preceding segments of simulated flight. Recording and playback are available in the independent and integrated training modes.

a. The record aspect continuously records the most recent 5 minutes of flight. Recording occurs automatically whenever the simulator is being flown from the trainee station. Periods of freeze, demonstration, or control of the simulator from the IOS are not recorded except to the extent that is required to establish initial conditions. Control movement is recorded in the integrated mode based upon selection of either the FLT CMD PILOT or FLT CMD CPG switchlight on the console control panel.

b. The playback aspect replays the cockpit control movements, cockpit instrument values, cockpit displays, motion cues, visual scenes, mechanical and aerodynamic sounds, and voice communications that occurred during the period of recorded time selected for replay. Recorded flight can be accessed for playback in approximately 15-second intervals up to the full 5 minutes available. The playback can be in real- or slow-time and can be frozen at any point by depressing the PROB FREEZE switch, thus allowing the instructor to discuss a problem in detail before resuming the playback.

c. Audio communications are not replayed during slow-time replay. Audio can be turned off/on at any time during real-time playback. The playback can be repeated as many times as required or desired with synchronized audio.

d. In slow-time, events take twice as long to occur as in real-time. Slow-time playback can be particularly useful in cases where the flight situation is changing very rapidly, as in autorotation or other emergency situations.

e. The RELAY AUDIO OFF and the REPLAY SLOW TIME switchlights on the forward control panel can be used to turn off the synchronized audio commentary and start and stop slow-time, respectively.

f. The record/playback command page (figure 7-64) is in group 4 (DEMOS/AF/RP) and can be accessed via the data entry keyboard by keying in 470 DISPL. Playback must be addressed from a freeze condition. Line 01 on CRT page 470 permits entry via the keyboard of playback segments in approximate 15-second increments (e.g., depress 01 TAB 130 ENTER for 2 minutes, 10 seconds of playback or 01 TAB 045 ENTER for 45 seconds of playback).

g. The instructor can terminate playback by any one of the following methods:

(1) Allow playback to replay total time selected and terminate with automatic freeze at end of replay.

NOTE

REPLAY FLYOUT or REPLAY RESUME functions can be employed at any time during a demonstration by activating PROB FREEZE, then selecting either one.

(2) Depress REPLAY FLYOUT on forward control panel to permit training to continue from that point in the playback. When PROB FREEZE switchlight stops flashing, depress PROB FREEZE switchlight to permit training to continue from that point.

(3) Depress REPLAY RESUME switchlight on forward control panel to continue training from the point at which playback was Initiated (problem freeze condition prior to start of playback). When PROB FREEZE switchlight stops flashing, depress PROB FREEZE switchlight to permit training to continue from that point.

h. Instructors can use the record/playback function to:

(1) Allow trainees to review their own performance.

(2) Verify that a disputed event did or did not occur.

(3) Relate trainee control Inputs to instrument Indications and systems performance.

(4) Slow down action to allow more time for trainee to grasp important relationships between control inputs and resulting instrument indications, aircraft attitude, and systems performance.

(5) Provide an aid in critiquing trainee performance.

(6) Provide an aid in reducing problems of overcontrol.

7-57. MISSING MAN. Missing man/independent mode is designed so that each flight simulator compartment (PLT and CPG) can be used independently to allow for two separate training sessions simultaneously. In the PLT training complex, software is added to compensate for hardware found only in the CPG complex and vise versa.

```
MET  00:00:39   INDEP   5      :00:00                                          PAGE   470
AMI     0   TEE   0   IC   1
REPLAY:   RECORD    :00:39                      RECORD/PLAYBACK COMMAND PAGE
FROZEN:
                                         RECORD/PLAYBACK
RA          0   ALT      512
AS    0   VS     0  HDG    19                TIME AVAILABLE FOR PLAYBACK IS   :00:39    (     39 SECONDS)
NR  100  T01     16  T02    19           01  PLAYBACK (ENTER TIME TO GO BACK IN SECONDS)

ROCKET-P-OFF  -C-NORM-  38
GUN    -P-OFF  -C-FXD  -1200
MISSLE-P-OFF  -C-ON   -   8

P-  0.000-100.000-225.000
C-  0.000- 32.250
STUDENT     0     EVENT   0

400        DEMOS/AF/RP
             INDEX

401-420  DEMONSTRATIONS

421-460  AUTOFLYS

470        PLAYBACK
```

Figure 7-64. Record/Playback Command Page Display

MET 00:00:00 INDEP 5
AMI 0 TEE 0 IC -2
REPLAY: RECORD :00:00
FROZEN:

RA 0 ALT 512
AS 0 VS 0 HDG 19
NR 100 TQ1 18 TQ2 18

ROCKET-P- OFF -C- NORM- 0
GUN -P- OFF -C- NORM- 0
MISSLE-P- OFF -C- ON - 0
P- 0.000-138.000-325.000
C-128.000- 40.500
STUDENT 0 EVENT 0

100	IC/CC INDEX
101-135	PILOT/INTEGRATED IC SETS
136-145	CPG IC SETS
150-151	CURRENT COND
160	PARAMETER FREEZE/ SYSTEM RESTORE/ TADS/PNVS PNT IND
170	COCKPIT DISCREP
175	MISSING MAN
180	FLIGHT MONITOR
190	VISUAL MODE HELP

:00:00 PAGE 175

MISSING MAN/INDEPENDENT MODE

01	ARCS ZONES	1 A, 2 B, 3 C, 4 D, 5 E	0
02	ARCS QTY	1 1, 2 2, 3 4, 4 8, 5 12, 6 24, 7 ALL	4
03	APU	(ON/OFF)	OFF
04	TAIL WHEEL	(LOCK/UNLOCK)	LOCK
05	PARKING BRAKE	(ON/OFF)	OFF
06	DASE SCAS	(ON/OFF)	ON
07	ATTD/HOVER HOLD	(ON/OFF)	OFF
08	NOE/APRCH	(ON/OFF)	OFF
09	ELECTRICAL POWER	(ON/OFF)	ON
10	ROTOR BRAKE	(ON/OFF)	OFF
11	RADAR ALT HI WARNING	(0-1500 FT)	100
12	RADAR ALT LO WARNING	(0-1500 FT)	10
13	TUNED ADF TO RBN # FOR RBN #S REF PG 601 & 602 RBN # 0 = OFF	(0-28)	11

Figure 7-65. Missing Mm/Independent Mode Master Page Display

```
MET    00:00:00     INTEG   2
AMI    0   TEE   0   IC   -1
REPLAY:  RECORD       :00:00
FROZEN:

RA         50   ALT       562
AS   0    VS   0    HDG  280
NR  100  TQ1    76  TQ2    76

ROCKET-P- NORM-C- NORM      0
GUN    -P- FXD -C- NORM- 1200
MISSLE-P- ON  -C- ON  -    16
P-   0.000-137.800-300.000
C-   0.000-110.000
STUDENT    0     EVENT     0

100       IC/CC INDEX

101-135 PILOT/INTEGRATED
          IC SETS

136-145 CPG IC SETS

150-151  CURRENT COND

160       PARAMETER FREEZE/
          SYSTEM RESTORE/
          TADS/PNVS PNT IND

170       COCKPIT DISCREP

175       MISSING MAN

180       FLIGHT MONITOR

190       VISUAL MODE HELP
```

```
                                                PAGE 175
                 MISSING MAN/INDEPENDENT MODE


AIRCRAFT SYSTEMS:

01   ADSS SWITCH   (ON/OFF)                     ON
```

Figure 7-66. Hissing Han/Independent Mode Slave Page Display

7-57.1 Visual moding in the independent mode allows for PNVS, TADS, and OTW display generation. (Refer to table 5-l.) Since visual displays in the independent mode depend on only one DIG providing that display, changing visual modes in one compartment affects the display on the other. This change is automatic to the compartment not instituting the visual mode edit. The compartment not instituting the change is placed in blinking freeze, and the visual mode changes on that compartment correspond to what is allowable for the edited mode.

7-57.2 The instructor has some control over missing man hardware in the independent mode by calling up missing man/Independent mode display CRT page 175.

a. The CPG IOS station missing man display (figure 7-65) provides the controlling instructor with insertable control functions, each of which is provided with a default value. The CPG IOS can use the missing man display to:

(1) Select which ARCS zone to load (line 01).

(2) Select quantity of rockets to be fired per trigger pull (line 02).

(3) Establish certain conditions by toggling lines 03 through 10 to turn the item on or off or, in case of line 04, lock or unlock the tailwheel.

(4) The last three lines (11 through 13) provide a means of establishing radar altitude high and low warnings and selecting one of 28 NDB ranges.

b. The master display is divided into three columns: the first identifies the function, the second identifies the range of the function, and the third lists the default or selected value.

c. The pilot IOS missing man display (figure 7-66) provides a means of turning on or off the air data sensor system (ADSS), which controls various aircraft systems. In the normal (default) mode, the ADSS switch is ON.

7-57.3 Ability to edit FCC waypoints in the independent mode is available to both instructors by CRT current conditions page 151. UTM and altitude entries are on separate lines for each waypoint. In addition, the instructions have the capability to select one of two training configurations at each trainer. The GUNNER/TARGET configuration provides training in weapons delivery skills and the CLEAN/THREAT configuration develops threat recognition and avoidance skills. The appropriate configuration is selected from CRT page 150, line 62.

7-57.4 OWNSHIP WEAPONS SCORING. The ownship weapons scoring page (figure 7-66.1) is a map page provided to show the following features:

Target or Illumination round of interest
Sighting designation path
Impact locations
Angular constraint markings for missiles
1, 2, and 3 km selectable scales
Target centered on map at time of engagement
Weapon type, disposition, and miss distance

a. The user can select any of the 12 defined engagements from the weapon scoring pages, as well as any of the three allowable map scales.

MET 03:26:03 INTEG 2
AMI 0 TEE 0 IC -1
REPLAY: RECORD :05:00
FROZEN:

RA 0 ALT 512
AS 0 VS 0 HDG 114
NR 100 TQ1 34 TQ2 35

ROCKET-P- NORM-C- NORM 0
GUN -P- FXD -C- NORM 320
MISSLE-P- ON -C- ON - 8
P-110.000 -108.000 0.000
C-110.000 -110.000
STUDENT 0 EVENT 0
01 ENGAGEMENT NUMBER 0

02 SCALE 0 KM

:00:00 UNCLASSIFIED PAGE 597

OWNSHIP WEAPONS SCORING

WEAPON TYPE
DISPOSITION
MISS DISTANCE:

LEFT/RIGHT	0.0
SHORT/LONG	0.0
LOW/HIGH	0.0

UNCLASSIFIED

Figure 7-66.1 Ownship Weapons Scoring Page

7-57.5 REMOTE DESIGNATION. The Remote Designation page (figure 7-66.2) is a map page provided to show the following features:

20 km x 20 km map
Map centered on target of interest when max is selected
Remote designation position, range vector, and its angular constraint markings when remote designator is active.
Ownship position and heading vector, and range vector
1 km markers on both range vectors
Target site, target type, remote designator code, and remote designator location

a. In addition, the user can select to erase or recall the ownship track lines.

7-57.6 THREAT SCORING GRAPHICS. The threat scoring graphics page (figure 7-66.3) is a plot page provided to graphically display the probability of hit and acquisition for each of the latest 12 events. The minimum required probability will also be shown on this page. The following data will be displayed for each defined event:

Event number
Target type number
Site
Hostility
Disposition

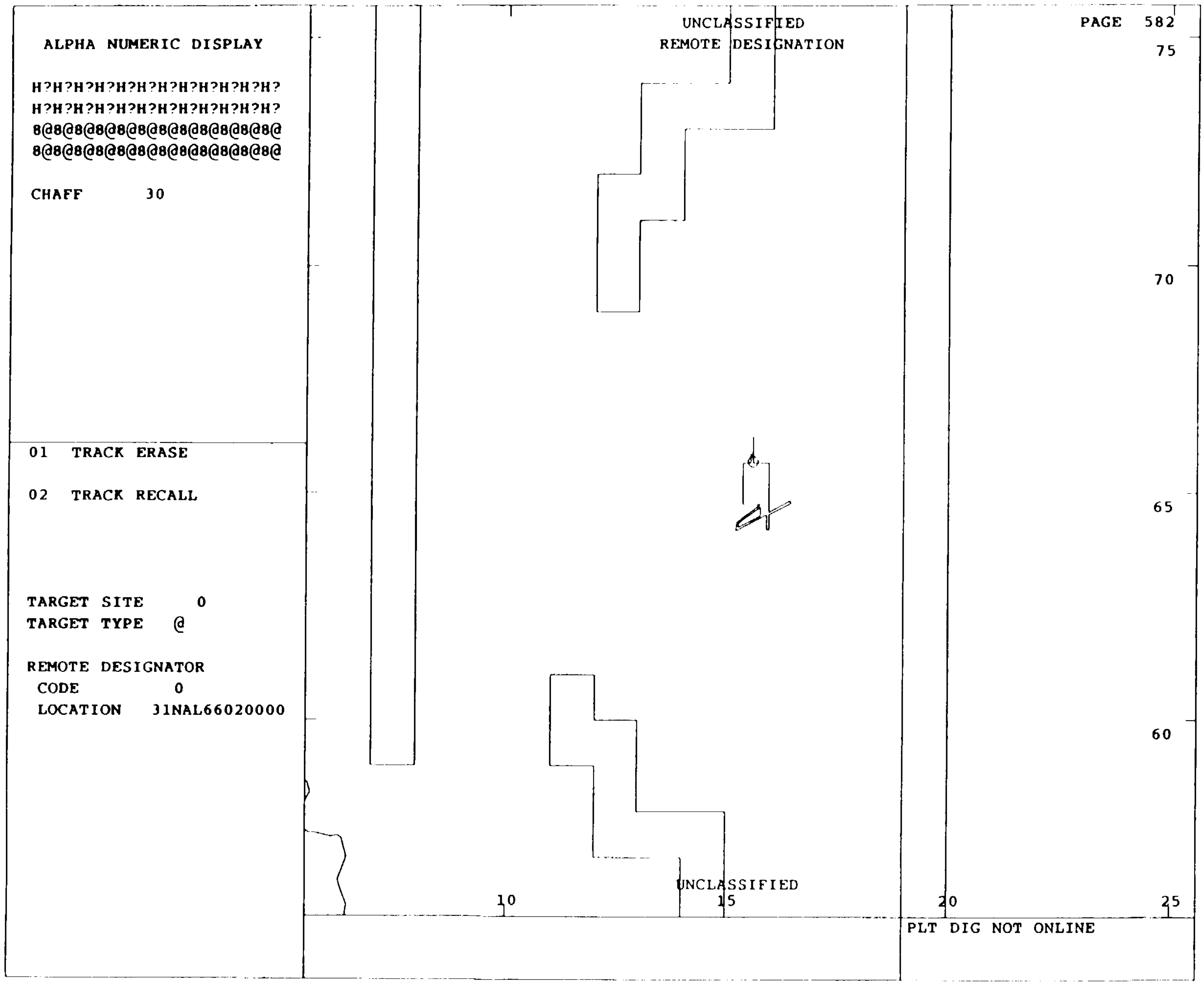


Figure 7-66.2 Remote Designation Page

MET 00:00:00 INDEP 5
AMI 0 TEE 0 IC -3
REPLAY: RECORD :00:00
FROZEN:

RA 0 ALT 512
AS 0 VS 0 HDG 19
NR 100 TQ1 18 TQ2 18

ROCKET-P- NORM-C- OFF - 0
GUN -P- FXD -C- OFF - 0
MISSLE-P- ON -C- OFF - 0
P- 0.000- 30.000-300.000
C- 0.000-128.000
STUDENT 0 EVENT 0

500 TARGET INDEX

501-520 TEE SETS

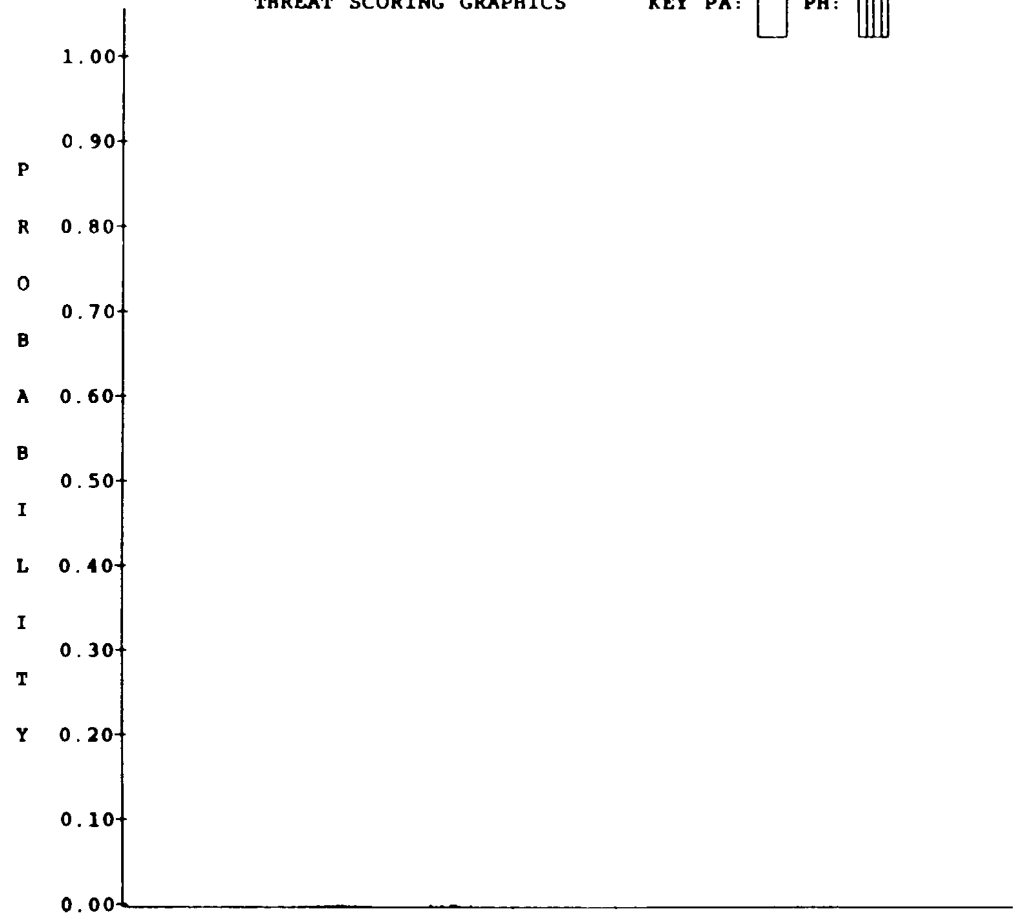
530 TARGET STATUS
531 TARGET TYPE LIST
532-535 TARGET SITE LIST
540 TGT SITE OVERVW
541-574 BAT POS TGT SITE

580 TARGET CONTROL
581 VISIONICS POINT-ING/REMOTE DESIG
582 REMOTE DESIG
583 TARGET EVAL

590 WEAPONS LOADING
591 ROCKET CONFIG
592 FARP CONTROL
593 THRT SCRNG GRPH
594 THREAT SCORING
595-596 OWNSHP ENGA PRFM
597 OWNSHP WPN SCRNG

:00:00 PAGE 593

THREAT SCORING GRAPHICS KEY PA: PH:



EVENT NUMBER	0	0	0	0	0	0	0	0	0	0	0	0
TGT TYPE NO	0	0	0	0	0	0	0	0	0	0	0	0
SITE	0	0	0	0	0	0	0	0	0	0	0	0
HOSTILITY	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
DISPOSITION												

Figure 7-66.3 Threat Scoring Graphics Page

Section III. AUTOMATED PROGRAM PREPARATION

7-58. INSTRUCTIONAL FEATURE PREPARATION. Provisions have been incorporated into the CMS that permit designated instructors to prepare the automated programs used by all instructors during training. In the interest of maintaining quality control of program content and standardizing training, only designated instructors are responsible for developing and/or modifying automated exercises. The skills required to make changes or to prepare new programs are those typically possessed by the AH-64 CMS flight instructors. No special technical or programming skills are required.

There are four feature preparation programs in the CMS, located in group 9 (PREPARATION). In order to call up the preparation programs from the IOS, the system must be enabled by a qualified operator in the computer room. Once the preparation programs are enabled in the computer room, any of the four programs can be called up via the data entry keyboard by keying in its 3-digit page number. The programs and their page numbers are:

Automatic malfunction insertion preparation (CRT page 920)
Demonstration preparation (CRT page 940)
Autofly preparation (CRT page 945)
Target engagement exercise preparation (CRT page 950)

b. Specific planning must take place prior to the development of an AM, demo, autofly, or TEE to:

(1) Develop a scenario that clearly indicates what the training objectives of the program are.

(2) Ensure that each exercise or demonstration supports one or more training objective(s).

c. The following checklist has been prepared for use as a guide to enhance the development of automated exercises and demos:

(1) Objectives of the training period:

(a) Perform basic aircraft flight maneuvers.

(b) Perform tactical instrument flight.

(c) Perform NOE flight with/without PNVS/TADS.

(d) Perform NOE navigation with/without PNVS/TADS.

(e) Perform target-type engagements:

Hard
Soft

(f) Weapons to be employed:

Missiles
Rockets
30-mm

(g) Type of weapons engagements:

Autonomous
Remote - Designation
Single-target engagements
Multitarget engagements

(h) Range to target engagement:

Long range
Medium range
Short range

(i) Perform emergency procedures/systems malfunction training:

1 Enroute to battle positions:

Instrument environment
Visual environment
PNVS/TADS environment
Mission go-no-go decision required

2 At the battle position:

With/without active threat
Aircraft systems failures
Hit induced malfunctions

3 Systems and crewmember:

Pilot
CPG

(2) Type of demo required to support training periods (remember, demos are of short duration and employment of them optimizes simulator training time):

Complex flight procedures (e.g., autorotations)
Complex engagement procedures and/or techniques
Emergency procedures

(3) Supporting materials/simulator features required for the training period:

Maps
OP-orders
IC sets
FARPS
Training period worksheets
TEE
AMI
DEMO

d. After assembling all the required material and preparing the flight profiles or flight scenarios and descriptions of the tactical situation, an AMI, demo, auto-fly, or TEE worksheet should be prepared. After completing the appropriate worksheet(s), the data is ready to be entered for the selected exercise or demo. Descriptions, instruction models, and worksheets for the preparation of each type of automated program are provided in the following sections.

7-59. AMI PREPARATION. The purpose of the AMI preparation feature is to permit AMI exercises to be prepared by selecting a set of malfunctions to be simulated during a subsequent training period and the identifying contingencies, which, if met during that period, will trigger the insertion of each of the selected malfunctions. Up to three contingencies (parameters) may be required to activate the appropriate malfunction. There is computer space for preparation and storage of 15 sets of AMI exercises in the CMS, while up to 10 malfunctions can be selected for each AMI exercise.

a. In conjunction with the development of the scenarios, the IC set to be used with each scenario should be identified. This is important because using a specified IC set with a particular AMI exercise provides an additional degree of standardization for the planned malfunction instruction and places the simulated aircraft in an initial position most likely to trigger the AMI.

b. When CRT page 920 is keyed in via the data entry keyboard, the main page area contains a blank AMI set page (figure 7-67) that is filled in during the preparation process and then stored in group 2 (MALFUNCTIONS, CRT pages 201 through 215) for recall during subsequent training periods. The data from the AMI worksheet (figure 7-68) should be entered on the appropriate lines on CRT page 920. The index and control area (figure 7-67) includes the AMI PREP IDENTIFIERS with reference numbers (REF #) for the PARAMETERS, OPERATORS, and CORRECTORS that are required for entry on the CRT page.

c. Line 01 AMI PREP (main page area, figure 7-67) is used to enter the identifying set number for the AMI set. When these sets are completed and stored, they appear in the malfunctions index (CRT page 200). and each has a discrete page number. CRT pages 201 through 215 correspond to AMI sets 1-15, respectively.

d. On CRT page 920, there are four lines of data for each malfunction. The first line for each malfunction (lines 02, 06, 10, 14, 18, 22, 26, 30, 34, and 38) is used to key in the selected 5-digit malfunction numbers for the set being prepared. The indented line numbers (03, 04. 05; 07, 08, 09; etc.) are for insertion of the contingencies that will trigger the malfunction. Up to three contingencies can be entered for each malfunction. Each contingency line accommodates one parameter, one operator, and one connector, as required to define the triggering activity. (The contingencies are further explained in subparagraph f).

e. Command line 77 is used to clear the display and, when keyed in, clears all data items entered. When an AMI prep is complete, keying command line 88 places the data displayed on CRT page 920 in permanent storage in the malfunction grouping where it is available for recall by its CRT page number (201 through 215). Command line 99 is used to terminate (cancel) the preparation activity: nothing is retained in storage when line 99 is keyed in.

```
MET  03:37:55    INTEG  2 | :00:00                                                    PAGE  920
AMI    0  TEE    0  IC  -1 |
REPLAY:  RECORD     :05:00 |                 AUTOMATIC MALFUNCTION INSERTION PREP
FROZEN:                    |
---------------------------|  01  SET NO.   0
RA           0  ALT    512 |
AS   0   VS   0    HDG 114 |  02  MALF                             30  MALF
NR 100 TQ1    34 TQ2    35 |    03                                   31
---------------------------|    04                                   32
                           |    05                                   33
                           |
                           |  06  MALF                             34  MALF
                           |    07                                   35
                           |    08                                   36
---------------------------|    09                                   37
ROCKET-P- NORM-C- NORM    0|
GUN    -P- FXD -C- NORM- 320|  10  MALF                             38  MALF
MISSLE-P- ON  -C- ON  -   8|    11                                   39
P-110.000-108.000-0.000    |    12                                   40
C-110.000-110.000          |    13                                   41
STUDENT    0     EVENT    0|
---------------------------|  14  MALF                             77  CLEAR DISPLAY
 AMI PREP IDENTIFIERS      |    15
                           |    16                                 88  STORE AMI SET AND  TERMINATE
PARAMETERS        REF #    |    17
                           |                                       99  TERMINATE
NG ENGINE #1 (%)      1    |  18  MALF
NG ENGINE #2 (%)      2    |    19
ALTITUDE AGL (FT)     3    |    20
ALTITUDE MSL (FT)     4    |    21
AIRSPEED (KIAS)       5    |
MISSION TIME (SECS)   6    |  22 MALF
WPNS REL TIME (SECS        |    23
 AFTER RELEASE)       7    |    24
PREV MALF INSERT           |    25
 (5 DIGIT MALF #)     8    |
OPERATORS :                |  26  MALF
     <                9    |    27
     =               10    |    28
     >               11    |    29
CONNECTORS :               |
    AND              12    |
    OR               13    |
                           |
CLEAR LINE          101    |
```

Figure 7-67. Automatic Malfunction Insertion Prep Page Display

1. The following CRT pages are required to complete this worksheet:

   Malfunction list
   AMI prep identifiers

2. Fill in the blanks with the appropriate reference numbers and values, and circle the correct command (i.e., TAB, ENTER).

LN, 01 TAB AMI SET NO. _____ ENTER

LN, 02 TAB MALF NO. _____ ENTER

LN, 03 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER

LN, 04 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER CONNECTOR REF # _____ ENTER

LN, 05 TAB PARAMETER REF # ___ TAB OPERATOR REF # ___ TAB VALUE ___ ENTER

LN, 06 TAB MALF NO. _____ ENTER

LN, 07 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER

LN, 08 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER CONNECTOR REF # _____ ENTER

LN, 09 TAB PARAMETER REF # ___ TAB OPERATOR REF # ___ TAB VALUE ___ ENTER

LN, 10 TAB MALF NO. _____ ENTER

LN, 11 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER

LN, 12 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER CONNECTOR REF # _____ ENTER

LN, 13 TAB PARAMETER REF # ___ TAB OPERATOR REF # ___ TAB VALUE ___ ENTER

Figure 7-68. AMI Prep Data Worksheet (Sheet 1)

LN. 14 TAB MALF NO. _____ ENTER

LN. 15 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER

LN. 16 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER CONNECTOR REF # _____ ENTER

LN. 17 TAB PARAMETER REF # ___ TAB OPERATOR REF # ___ TAB VALUE ___ ENTER

LN. 18 TAB MALF NO. _____ ENTER

LN. 19 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER

LN. 20 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER CONNECTOR REF # _____ ENTER

LN. 21 TAB PARAMETER REF # ___ TAB OPERATOR REF # ___ TAB VALUE ___ ENTER

LN. 22 TAB MALF NO. _____ ENTER

LN. 23 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER

LN. 24 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER CONNECTOR REF # _____ ENTER

LN. 25 TAB PARAMETER REF # ___ TAB OPERATOR REF # ___ TAB VALUE ___ ENTER

LN. 26 TAB MALF NO. _____ ENTER

LN. 27 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER

LN. 28 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER CONNECTOR REF # _____ ENTER

LN. 29 TAB PARAMETER REF # ___ TAB OPERATOR REF # ___ TAB VALUE ___ ENTER

Figure 7-68. AMI Prep Data Worksheet (Sheet 2)

LN, 30 TAB MALF NO. _____ ENTER

LN, 31 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER

LN, 32 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER CONNECTOR REF # _____ ENTER

LN, 33 TAB PARAMETER REF # ___ TAB OPERATOR REF # ___ TAB VALUE ___ ENTER

LN, 34 TAB MALF NO. _____ ENTER

LN, 35 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____TAB/ENTER

LN, 36 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER CONNECTOR REF # _____ ENTER

LN, 37 TAB PARAMETER REF # ___ TAB OPERATOR REF # ___ TAB VALUE ___ ENTER

LN, 38 TAB MALF NO. _____ ENTER

LN, 39 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____TAB/ENTER

LN, 40 TAB PARAMETER REF # _____ TAB OPERATOR REF # _____ TAB

VALUE _____ TAB/ENTER CONNECTOR REF # _____ ENTER

LN, 41 TAB PARAMETER REF # ___ TAB OPERATOR REF # ___ TAB VALUE ____ENTER

Figure 7-68. AM Prep Data Worksheet (Sheet 3)

f. The index and control area of CRT page 920 (AMI PREP IDENTIFIERS, figure 7-67) provides command reference numbers (RRF #) so that titles and or multiple items can be keyed in with a single keystroke.

(1) Reference numbers 1 through 8 are used to enter the appropriate triggering parameters. When reference number 1 through 8 is keyed in on a specific line, the parameter title appears on that line of CRT page 920. The appropriate metrics for parameters are shown in the parenthetical note behind the parameter (e.g., %, FT, KIAS, MINS, etc.).

(2) Reference numbers 9 through 11 are used to enter arithmetic operators of less than, equal to, or greater than (<, =, >) the assigned value for the triggering parameter (00000 through 99999). The assigned value must be keyed in as a 5-digit entry after the associated operator reference number (e.g., 9 TAB 02000 ENTER is the entry for less than 2000 feet). Each parameter must have an operator and a value assigned to trigger it.

(3) Reference numbers 12 and 13 are used to enter logical connectors. If more than one parameter is to be associated with a malfunction, than a logical connector (AND, OR) must be designated for all but the last parameter. Reference numbers 12 and 13 are used for these connectors. When AND is used as a connector, all parameters connected with AND must be met to trigger the malfunction. If OR is used as a connector, any of the parameters connected by OR will trigger the malfunction when it is met.

(4) Reference number 101 is used to clear a line (e.g., 5 TAB 101 clears line 5). When a line which has other lines dependent on it is cleared the dependent lines are also cleared (e.g., 2 TAB 101 clears lines 2, 3, 4 and 5).

g. During AMI preparation functions, the edit area of the CRT page provides operator prompts for data input and error messages for any out-of-range or invalid entries. Numerical inputs via the keyboard are echoed in the edit area with a cursor to Indicate the next entry. When TAB is depressed between data fields, the appropriate data input appears on the first line of the edit area (e.g., when 03 TAB is keyed In, the prompt appearing in the edit area states: ENTER PARAMETER REF #_____).

NOTE

> Each time ENTER is keyed in, the data in line 3 of the edit area blanks and the data appears on that numbered line of the prep page (main page area).

h. Table 7-13 indicates the procedure required to enter the worksheet data into CRT page 920 and the prompts and data displayed in the edit area. In the entry column are the numbers to be entered plus the appropriate action key (e.g., DISPL, TAB, ENTER). The edit area dislays column depicts three line entries to include (Blank) when nothing is shown and a line (_____) for the cursor mark. This procedure completes the required entries for the first malfunction and its associated parameters. The process is continued for each additional malfunction (up to 10) to be entered. The additional malfunctions use lines 06, 10, 14, etc.

Table 7-13. AMI Prep Data Entry Procedure

Entry	Edit area displays
1. To call up AMI prep page, enter:	
920	(Blank) 920 ___ (Blank)
DISPL	(Blank) _____ (Blank)
2. To assign set number, enter:	
01	(Blank) 01_____ (Blank)
TAB	ENTER SET NO. 01 ____ (Blank)
02	(Blank) 02_____ (Blank)
ENTER	(Blank) _____ (Blank)
3. To enter first malfunction, enter:	
02	(Blank) 02 ____ (Blank)
22307	(Blank) 02 22307_____ 02 MALF 22307 01 FIRE INTERNAL
ENTER	(Blank) _____ (Blank)

Table 7-13. AMI Prep Data Entry Procedure - Continued

Entry	Edit area displays
4. To enter first parameter, enter:	
03	(Blank) 03_ (Blank)
TAB	ENTER PARAMETER REF # 03 _ (Blank)

NOTE

Each time TAB is entered, a prompt appears in the edit area requesting specific data.

Entry	Edit area displays
1	ENTER PARAMETER REF # 03 1 _ 03 NG ENGINE #1 (%)
TAB	ENTER OPERATOR REF # 03 1_ 03 NG ENGINE #1 (%)
5. To enter first operator, enter:	
11	ENTER OPERATOR REF # 03 1 11_ 03 NG ENGINE #1 (%) >
TAB	ENTER PARAMETER VALUE 03 1 11_ 03 NB ENGINE #1 (%)1 >
6. To enter parameter value, enter:	
00080	ENTER PARAMETER VALUE 03 1 11 00080 03 NG ENGINE #1 (%) > 00080
ENTER	(Blank) _ (Blank)

Table 7-13. AMI Prep Data Entry Procedure - Continued

Entry	Edit area displays
8. To enter second parameter, enter:	
04	(Blank) 04___ (Blank)
TAB	ENTER PARAMETER REF # 04___ (Blank)
3	ENTER PARAMETER REF # 04 3 ___ 04 ALTITUDE AGL (FT)
TAB	ENTER OPERATOR REP # 04 3 ___ 04 ALTITUDE AGL (FT)
9. To enter second operator, enter:	
10	ENTER OPERATOR REF # 04 3 10 ___ 04 ALTITUDE AGL (FT) =
TAB	ENTER PARAMETER VALUE 04 3 10 ___ 04 ALTITUDE AGL (FT) =
10. To enter parameter value, enter:	
00025	ENTER PARAMETER VALUE 04 3 10 00025 04 ALTITUDE AGL (FT) = 00025
TAB	ENTER CONNECTOR REF # 04 3 10 00025 ___ 04 ALTITUDE (FT) - 00025
11. To enter second connector, enter:	
13	ENTER CONNECTOR REF # 04 3 10 00025 13___ 04 ALTITUDE AGL (FT) = 00025 OR
ENTER	(Blank) ___ (Blank)

Table 7-13. AMI Prep Data Entry Procedure - Continued

Entry	Edit area displays
12. To enter third parameter, enter:	
05	(Blank) 05 ___ (Blank)
TAB	ENTER PARAMETER REF # 05___ (Blank)
6	ENTER PARAMETER REP # 05 6 ___ 05 MISSION TIME (MIN)
TAB	ENTER OPERATOR REF # 05 6___ 05 MISSION TIME (MIN)
13. To enter third operator, enter:	
11	ENTER OPERATOR REF # 05 6 11___ 05 MISSION TIME (MIN) >
TAB	ENTER PARAMETER VALUE 05 6 11 ___ 05 MISSION TIME (MIN) >
14. To enter parameter value, enter:	
00015	ENTER PARAMETER VALUE 05 6 11 00015 05 MISSION TIME (MIN) > 00015
ENTER	(Blank) ___ (Blank)

7-60. DEMONSTRATION PREPARATION. The purpose of the demonstration (DEMO) preparation feature is to permit demos to be prepared by recording a period of flight performance in the CMS, modifying that recording as required to enhance its instructional value, and adding the appropriate instructional commentary. The subject matter of demos should consist of complex individual maneuvers or a rapidly occurring series of maneuvers. It is not expected that demos will be prepared to illustrate mission segments in which individual maneuvers are separated by extended periods of relatively simple aircraft control tasks. For these reasons, most demos, including those that contain pauses and slow-time segments, will be brief (i.e.. less than 5 minutes in duration). Long demos are counterproductive in most instances and should not be prepared. There is computer space for preparation and storage of 20 demos of up to 5 minutes duration each.

a. Recording of a demo is normally preceded by the development of a scenario for the demo. The scenario should identify or include the follwing:

(1) Simulated conditions under which the maneuver(s) of interest will be flown (IC set), and the flight profile to be followed.

(2) Number of repetitions of all or designated portions of the maneuver that are to be included in the completed demo.

(3) Where pauses are to appear for insertion of instructional commentary.

(4) Which segments, if any, are to be presented in slow-time.

(5) Beginning of each demo segment that is to be directly accessible by the instructor.

(6) Script for the planned instructional commentary.

b. Following development of the scenario with its accompanying audio commentary script, the demo described in it is ready to be prepared. The follwing sequence of activities is required to prepare a demo: enable demo prep: set up, fly, and record flight profile; and edit (pauses, slow-time, segment identification, audio recording).

(1) Enable demo prep. Setting up the CMS for the task of preparing a demo, except for enabling the preparation feature at the computer roan, is comparable to setting it up for an instructional training period. Demo prep enable is defined as a state in which the commands on the demo prep CRT page 940 (figure 7-69) are processed and/or executed. The following conditions must be satisfied to enable the demo prep instructional feature:

(a) Demo prep can be selected only when the prep mode is enabled at the computer room.

(b) Demo prep CRT page 940 is then called up from the keyboard at the master IOS. (Either IOS can be the master, but the master cannot be changed while demo prep is active.)

NOTE

During demo recording. the demo records on the CPG disk only.

```
MET   03:38:21    INTEG   2  :00:00                                                        PAGE  940
AMI     0   TEE    0   IC   -1                       DEMONSTRATION PREPARATION
REPLAY:  RECORD        :05:00
FROZEN:                          01 CREATE DEMO NUMBER:
                                 02 MODIFY/CONTINUE PREP OF DEMO NUMBER:
RA           0  ALT        512   RECORD/REPLAY (CURRENT SEGMENT:     0
AS    0     VS    0     HDG 114
NR  100  TQ1     34  TQ2    35   03 RECORD (SEGMENT TO START)          0   (11=CURRENT LOCATION, 12=TERMINATE)
                                 04 PLAYBACK (SEGMENT TO START):       0

                                 05 SET SEGMENT                                        TERMINATE DEMO PREP
                                 06 CLEAR SEGMENT
                                                                                       88 PREP COMPLETE, SAVE
                                 07 PAUSE SET                                             DEMO FOR REPLAY
ROCKET-P- NORM-C- NORM       0   08 PAUSE END                                          99 PREP INCOMPLETE, SAVE
GUN    -P- FXD -C- NORM-   320   09 PAUSE CLEAR                                           CURRENT STATE OF DEMO
MISSLE-P- ON  -C- ON  -      8                                                            FOR CONTINUATION
P-110.000-108.000-0.000          10 SLOWTIME SET
C-110.000-110.000                11 SLOWTIME END
STUDENT     0     EVENT      0   12 SLOWTIME CLEAR

                                 13 RECORD AUDIO
 400        DEMOS/AF/RP          14 MONITOR AUDIO
             INDEX                                                              CURRENT DEMO TIME   0:00

 401-420   DEMONSTRATIONS        REPLAY CONFIGURATION                           SEGMENT      DEMO TIME

 421-460   AUTOFLYS              15 INTEGRATED MODE                                1
                                 16 INDEPENDENT MODE                               2
 470        PLAYBACK             17 VISUAL REPLAY MODE:     0                      3
                                                                                   4
                                                                                   5
                                                                                   6
                                                                                   7
                                                                                   8
                                                                                   9
                                                                                  10

                                                                                DEMO END       0:00
```

Figure 7-69. Demonstration Preparation Page Display

(c) The instructor preparing the demo must specify the replay configuration of the CMS for playback of the demo before preparation of the demo. Replay configuration selections (INTEGRATED, INDEPENDENT, and VISUAL REPLAY MODE) are on lines 15 through 17 of CRT page 940.

(d) The simulator must be in a freeze state when enabling demo prep.

(e) Commands are honored only from the master IOS, although the other station can call up and monitor the prep page.

(f) Demos must be prepared while the CMS is in the integrated mode.

(g) The DEMO NO. (line 01) must be entered to provide identification for subsequent recall of the demo (e.g., 01 TAB 02 ENTER identifies this as demo number 2).

(2) Set up, fly, and record. After enabling the demo prep mode, one instructor flies the simulator from the pilot trainee station, another may be required in the CPG trainee station, and a third operates the selected master IOS. The demo training objectives determine whether two or three instructors are required to prepare the demo. The following rules and guidelines are provided to assist in preparation and to define the function of the commands on the demo prep CRT page 940:

(a) The instructor can call up, edit, and initialize IC sets while in demo prep. Initialization must be accomplished while in freeze.

(b) A stored reset point can be used to Initialize for a demo start point (if one exists), or the current conditions existent when entering demo prep may be used. Current conditions may also be edited to define the start state of the demo.

(c) The instructor selects the record by editing line 03.

(d) The instructor flies and records the maneuver record and terminates the recording by freezing (manual or auto). The maneuver can then be reset to the beginning for re-record or playback (line 04) and monitor of the recorded maneuver. The demo elapsed-time indicator (in the CRT status area) provides the information to enable selecting any portion of the recording for playback.

(e) When the maneuver record is satisfactory, the RECORD command (line 03) can be used to sequence to the next maneuver record for recording the next portion of the demo.

(3) Demo edit functions. Editing can include the insertion of pauses, periods of slow-time, segmentation of the demo, and the addition of the appropriate instructional commentary. Each of these editing functions are described below.

(a) Periods of pause can be inserted (during freeze or playback) to permit extended audio commentary in the demo without a conflict between commentary and the maneuver being demonstrated. The pause is inserted via the PAUSE SET command (line 07). The inserted pause(s) can be as long as desired, up to 5 minutes. However. if a pause were inserted midway in a recording and the total record plus pause time exceed 5 minutes, no additional recording time would be available for the demo. By deleting pauses (line 09), the lost recording time can be regained. The period of pause can be terminated and the recording continued by Inserting the PAUSE END command (line 08). Remember, if the recording and pauses total 5 minutes, additional demo activities cannot be added. Five minutes is the maximum time available for a demo, Including all recording pauses.

(b) Slow-time periods are inserted during playback via the SLOWTIME SET command (line 10). Periods of slow-time are ended via the SLOW-TIME END command (line 11). Periods of slow-time can be removed by using the SLOW-TIME CLEAR command (line 12).

(c) The PLAYBACK command (line 04) is active during pause and slowtime edit activities and can be used to review the preparation.

(d) Up to ten segments are automatically numbered via the SET SEGMENT command (line 05). Nine of the segments can be inserted anywhere, and need not be associated with pauses for freezes. Segment one is the beginning of the demo. The segment identifies an individually addressable point within a demo that may be desired for a future start point. These segments can be labeled with text to identify and describe the segment. Segments can be identified and marked during on-the-fly, playback, or during freezes. During playback and review, unwanted segment marks can be deleted via the CLEAR SEGMENT command (line 06).

(e) The PLAYBACK command (line 04) is active during segmentation and can be used to review the preparation up to this point.

(f) During playback of the demo, including periods of pause and slow-time. audio commentary can be recorded and synchronized throughout the demo. The RECORD AUDIO command (line 13) initiates recording.

(g) The audio commentary can then be monitored during subsequent playbacks Via the MONITOR AUDIO command (line 14).

(h) When the demo is complete and ready for permanent storage and subsequent recall during training, the instructor Inserts the PREP COMPLETE, SAVE DEMO FOR REPLAY command (line 88). Demos are numbered 1 through 20 and are filed on CRT pages 401 through 420, respectively.

(i) During preparation of a demo, the instructor should work on a temporary storage or work disk. Incomplete demos or demos being edited can then be stored for future access and preparation/editing activities until they are ready for the permanent file. The PREP INCOMPLETE, SAVE CURRENT STATE OF DEMO FOR CONTINUATION command (line 99) can be used at the completion of a demo prep period to save an incomplete effort. This command can be used at any point during the development of a demo. Demos that have been completed and are in the permanent file can be modifled within certain constraints. These same constraints apply to demos being prepared for the first time.

(j) With the exception of maneuver recording, any phase of the preparation process can be addressed and edited at any time. This includes editing pauses (adding/deleting), slow-time, segmentation, and audio recording. Remember, modification of pauses or slow-time may impact the synchronization of the audio commentary so that it may require some modification.

(k) The major exception to the editing/modification process as it affects maneuver recording Involves re-recording. If, for any reason, a segment of the recorded flight maneuver(s) requires a modification, all of the demo beyond the point of modification will be lost. This means, for example, if the recorded portion of the last 2 minutes of flight is modified, all the pauses, slow-time segment, segmentation, and audio after that point are automatically erased. This provision avoids discontinuities and disruptions to the demo. However, after re-recording any part of a complete or partially complete demo, the editing process as described above can be accessed and the newly modified demo then completed.

(4) Text insertion. Descriptions and/or titles can be added to the demo number and to each segment of the demo for display on CRT pages. This activity is a process that is performed offline by a separate task.

7-61. AUTOFLY PREPARATION. The purpose of the autofly preparation is to permit the recording of flight profiles that can be used with the CPG trainee cockpit when it is operating in the independent mode. Preparation of an autofly recording is normally preceded by the development of a scenario for the flight profile to be recorded.

a. The scenario should identify or include the following:

(1) Specification of the simulated conditions under which the flightpath and maneuvers of Interest will be flown.

(2) Planned route of flight.

(3) Definition of targets arrays and type of threat activities required.

(4) Identification of malfunctions and/or system failures that will affect the training mission.

(5) Requirements for instructions or other communications to the CPG during the training mission.

b. Following development of the scenario, the flight profile is ready to be recorded. Autofly recordings can be up to 15 minutes long. There is sufficient storage space for up to 40 autofly recordings. once recorded and stored, the autofly sets are indexed on CRT page 400. CRT pages 421 through 460 have been dedicated for autofly sets and provide a description of each set. (See figure 7-63.)

c. During the recording of the flight profile, the instructor can make use of other CMS instructional features, such as problem freeze, store/reset, current conditions, and IC sets, as often as necessary until a model performance of the desired flight profile is obtained. This process can be repeated until the instructor is satisfied that each segment of the profile has been flown to the required standards.

d. After completing the recording of the flight profile, up to nine segment identifiers that permit direct access to the individual segments of the recording for future training use can be added. The text description and segment identifier descriptions can then be added to the autofly set by running a separate offline task.

e. The autofly preparation CRT page is 945. (See figure 7-70.) The following rules and guidelines are applicable to the use of this page during preparation:

(1) The AUTOFLY SET NO. (line 01) is used for identification and recall of autofly sets (e.g., 01 TAB 02 ENTER identifies autofly set No. 2).

(2) Autofly recording begins at the record number selected by the user. The maneuver record is defined by recordings between periods of freeze. For a new autofly, recording must start at segment one.

(3) The RECORD command (line 03) starts the recording (when PROB FREEZE is released). When that portion of the profile is complete. problem freeze is activated.

(4) The recorded portion can now be played back for review and critique via the PLAYBACK command (line 04). The autofly elapsed-time indicator (in the status area) provides a time indication of the playback period.

(5) (Deleted)

(6) (Deleted)

(7) The SET SEGMENT command (line 05) is used to mark segment beginnings. as desired. The CLRAR SEGMENT command (line 06) removes a segment marking that is not required or desired.

(8) When the segmentation of the recording is complete, autofly set is ready for permanent storage. The PREP COMPLETE, SAVE AUTOFLY FOR REPLAY command (line 88) is used. The text descriptions for autofly can be added by processing the offline task to do this.

MET 03:38:47 INTEG 2
AMI 0 TEE 0 IC -1
REPLAY: RECORD :05:00
FROZEN:

RA 0 ALT 512
AS 0 VS 0 HDG 114
NR 100 TQ1 34 TQ2 35

ROCKET-P- NORM-C- NORM 0
GUN -P- FXD -C- NORM 320
MISSLE-P- ON -C- ON - 8
P-110.000-108.000-0.000
C-110.000-110.000
STUDENT 0 EVENT 0

400 DEMOS/AF/RP INDEX

401-420 DEMONSTRATIONS

421-460 AUTOFLYS

470 PLAYBACK

:00:00 PAGE 945

AUTOFLY PREPARATION

AUTOFLY PREP ACTIVITY
01 CREATE NEW AUTOFLY -
02 MODIFY/REPLAY EXISTING AUTOFLY -
CURRENT AUTOFLY SEGMENT:

03 RECORD (SEGMENT TO START): 0 (11=CURRENT LOCATION, 12=TERMINATE)
04 PLAYBACK (SEGMENT TO START): 0
05 SET SEGMENT
06 CLEAR SEGMENT
07 VISUAL REPLAY MODE: 0

TERMINATE AUTOFLY PREP

88 PREP COMPLETE, SAVE
AUTOFLY FOR REPLAY
99 PREP INCOMPLETE, SAVE
CURRENT STATE OF AUTOFLY
FOR CONTINUATION

VEHICLE IS NOT IN HOVER CONDITION

NOTE:
A HOVER IS ACHIEVED WHEN THE FOLLOWING CONDITIONS ARE MET:
1. AIRSPEED IS LESS THAN 2 KNOTS
2. ACCELERATION BALL IS CENTERED
3. AIRCRAFT IS IN THE AIR

CURRENT AUTOFLY TIME :00:00

SEGMENT	AUTOFLY TIME
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
AUTOFLY END	:00:00

Figure 7-70. Autofly Preparation Page Display

7-62. TARGET ENGAGEMENT EXERCISE PREPARATION. The purpose of the TEE preparation feature is to permit target engagement exercises to be prepared by selecting a set of target events to be simulated during a subsequent instructional activity and identifying specific contingencies that, if met, during such instruction, will trigger the insertion of each of the selected target events. Preparation of a TEE is preceded by the development of a tactical situation description or scenario. This scenario provides a context within which the intended target engagement instructional activities can take place. It also permits the instructor to determine which target sites should be activated, what targets should be placed on each activated site, when target events should be activated to be of most instructional value, and the triggering contingencies that are both probable (as to occurrence) and realistic (as to circumstances of occurrence). There is computer space for preparation and storage of 20 TEE's in the CMS.

a. The major characteristics of each TEE are as follows:

(1) Each TEE can accomnodate up to 10 individual targets.

(2) Targets are selected from the 44 types on target list CRT pages 951A, 951B and 951C.

(3) A maximum of five targets per TEE can be assigned to travel over predetermined paths, and five can be assigned to fixed sites.

(4) Up to 15 events can be programmed for each TEE (events equal motion and hostile actions).

(5) Up to three sets of triggering contingencies can be defined for each event. (Contingencies include parameters and operators and. if more than one parameter is selected, connectors required.)

(6) Specific aircraft malfunctions/systems failures can be assigned to each hostile target; the failure occurs if the threat scores a hit on ownship.

(7) HOT or COLD IR coding can be assigned to each target (only stationary targets can be IR COLD).

(8) For ground targets assigned to sites permitting motion, travel pathways can be selected, and vehicle speed from 0 to 40 kph, in 10-kph increments, can be designated.

(9) Five sites are designated for airborne targets only. When any of these sites are assigned to a TEE, vehicle speed up to 200 kph can be designated.

b. In conjunction with the development of the scenario for the TEE, the instructor should identify IC or autofly set(s) to be used with it. This is important because using a specific IC or autofly set with a particular exercise will place the simulated aircraft in the vicinity of the target sites to be activated and provide an additional degree of standardization for the planned target engagement instruction.

c. When CRT page 950 is called up via the data entry keyboard, the main page area contains a blank target engagement exercise prep page (figure 7-71) that is completed during the preparation process and then stored in group 5 (TARGETS, CRT pages 501 through 520) for recall during subsequent training periods. The data from

```
MET   03:39:20    INTEG  2  :00:00                                                      PAGE  950
AMI    0   TEE    0   IC  -1              TARGET ENGAGEMENT EXERCISE PREP
REPLAY:  RECORD      :05:00   01   SET NO.    0
FROZEN:
                              ITEM                          HOS ACT  M-H       IR   MOTION PATHWAY SPEED
RA            0  ALT     512   02              AT SITE
AS    0    VS    0    HDG 114  03              AT SITE
NR  100  TQ1     34  TQ2   35  04              AT SITE
                               05              AT SITE
                               06              AT SITE
                               07              AT SITE
                               08              AT SITE
                               09              AT SITE
                               10              AT SITE
ROCKET-P- NORM-C- NORM      0  11              AT SITE
GUN    -P- FXD -C- NORM   320
MISSLE-P- ON  -C- ON  -     8  12 ITEM                   32 ITEM                   52 ITEM
P-110.000-108.000 0.000          13                         33                        53
C-110.000-110.000                14                         34                        54
STUDENT     0     EVENT     0    15                         35                        55

   TEE PREP IDENTIFIERS        16 ITEM                   36 ITEM                   56 ITEM
                                 17                         37                        57
 TARGET EVENTS     REF #         18                         38                        58
                                 19                         39                        59
 ENABLE MOTION          1
 ENABLE HOSTILE         2      20 ITEM                   40 ITEM                   60 ITEM
 ACTIVITY                        21                         41                        61
                                 22                         42                        62
 PARAMETERS  :                   23                         43                        63

 ALT  (FT AGL)          3      24 ITEM                   44 ITEM                   64 ITEM
 LOS  (EXPOSURE-SECS)   4        25                         45                        65
 TGT  (RANGE-METERS)    5        26                         46                        66
 WPNS (RELEASE-SECS)    6        27                         47                        67
 OPERATORS  :
      <                 7      28 ITEM                   48 ITEM                   68 ITEM
      =                 8        29                         49                        69
      >                 9        30                         50                        70
 CONNECTOR                       31                         51                        71
    AND                10
    OR                 11      77  CLEAR DISPLAY         88  STORE AND TERMINATE   99  TERMINATE

 CLEAR LINE           101
```

Figure 7-71. Target Engagement Exercise Prep Page Display the TEE worksheet (figure 7-72) should be entered on the appropriate lines of CRT page 950. The index and control area (figure 7-71) includes the TEE PREP IDENTIFIERS with reference numbers (REF #) for the TARGET EVENTS, PARAMETERS, OPERATORS, and CONNECTORS that are required for entry on the CRT page.

d. Line 01 (main page area, figure 7-71) is used to enter the identifying set number for the TEE. Command line 77 is used to clear the display and, when keyed In, clears all data items entered. When a TEE prep is complete, keying command line 88 places the data displayed on CRT page 950 in permanent storage in the target grouping where it is available for recall by its CRT page number (501 through 520). Command line 99 is used to terminate (cancel) the preparation activity; nothing is retained in storage when line 99 is keyed in.

e. On CRT page 950, there are four lines of data for each target In lines 02 through 11. The first line for each target (lines 12, 16, 20, etc.) is for identifying the target site number from the target site list and the event reference number from the Index and control area. The indented line numbers (13, 14, 15; 17, 18. 19; etc.) are for insertion of the contingencies that will trigger the event. Up to three contingencies can be entered for each event. Each contingency line accommodates one parameter, one operator, and one connector, as required to define the triggering activity. (The contingencies are further explained in the following subparagraph f.)

f. The index and control area of CRT page 950 (TEE PREP IDENTIFIERS, figure 7-71) provides command reference numbers (REF #) so that titles and or multiple items can be keyed In with a signal keystroke.

(1) Reference numbers 1 and 2 are used to key in the target event. When motion (reference number 1) is enabled and the triggering contingencies have been met, the target travels over a predetermined path at a designated speed for approximately 15 km and stops. When hostile activity (reference number 2) is enabled and the triggering contingencies have been met, the target fires at the ownship. If a hit (malfunction code number) has been designated and the threat algorithm concurs, a malfunction or system failure occurs with the hit.

(2) Reference numbers 3 through 6 are used to enter the appropriate triggering parameters. When any reference number (3 through 6) is keyed in on a specific line, the parameter title appears on that line of CRT page 950. The appropriate metrics for parameters are shown In the parenthetical note behind the parameter (e.g., %, FT, KIAS, MINS, etc.). The following parameters can be assigned as triggering contingencies:

ALT AGL	- Ownship altitude
LOS	- Line-of-sight (intervisibility) between ownship and target, measured in seconds of exposure
TGT RANGE	- Distance from ownship to target, measured in meters
WPNS RELEASE	- Firing/release of ownship weapons, measured in seconds after release

(3) Reference numbers 7 through 9 are used to enter arithmetic operators of less than, equal to, or greater than (<, =, >) the assigned value for the triggering parameter. The assigned value must be keyed in after the associated operator reference number (e.g., 9 TAR 20 ENTER is the entry for greater than 20 feet). Each parameter must have an operator and a value assigned to trigger it.

1. The following CRT pages are required to prepare this worksheet:

   Target type list
   Target site list
   Target site overview
   Target site pathway detail
   Malfunctions list
   TEE prep identifiers
   List of current TEE sets

2. Fill in the blanks with the appropriate reference numbers and values, and circle the correct command (i.e., TAB, ENTER)

LN, 01 TAB TEE SET NO. _____ ENTER

	TGT TYPE		SITE		HOS ACT 1=ON 2=OFF		HIT CODE		IR 1=HOT 2=COLD		MOTION		PATH		SPEED	
LN, 02 TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	ENTER
LN, 03 TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	ENTER
LN, 04 TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	ENTER
LN, 05 TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	ENTER
LN, 06 TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	ENTER
LN, 07 TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB						
LN, 08 TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB						
LN, 09 TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB						
LN, 10 TAB	___	TAB	___	TAB	___	TAB	___	TAB	___	TAB						

LN, 12 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN, 13 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN, 14 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER

Figure 7-72. TEE Prep Data Worksheet (Sheet 1)

LN, 15 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN, 16 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN, 17 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN, 18 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER

LN, 19 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN, 20 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN, 21 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN, 22 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER

LN, 23 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN, 24 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN, 25 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN, 26 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER

LN, 27 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN, 28 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN, 29 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

Figure 7-72. TEE Prep Data Worksheet (Sheet 2)

LN. 30 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER

LN. 31 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER

LN. 32 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN. 33 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER

LN. 34 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER

LN. 35 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER

LN. 36 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN. 37 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER

LN. 38 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER

LN. 39 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER

LN. 40 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN. 41 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER

LN. 42 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER

LN. 43 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER

Figure 7-72. TEE Prep Data Worksheet (Sheet 3)

LN. 44 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN. 45 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN. 46 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER

LN. 47 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN. 48 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN. 49 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN. 50 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER

LN. 51 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN. 52 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN. 53 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN. 54 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER

LN. 55 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

LN. 56 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER

LN. 57 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB

VALUE ____ TAB/ENTER

Figure 7-72. TEE Prep Data worksheet (Sheet 4)

LN, 58 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER
LN, 59 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER
LN, 60 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER
LN, 61 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER
LN, 62 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER
LN, 63 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER
LN, 64 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER
LN, 65 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER
LN, 66 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER
LN, 67 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER
LN, 68 TAB SITE # ____ TAB EVENT REFERENCE # ____ ENTER
LN, 69 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER
LN, 70 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER CONNECTOR REF # ____ ENTER
LN, 71 TAB PARAMETERS REF # ____ TAB OPERATOR REF # ____ TAB
VALUE ____ TAB/ENTER

Figure 7-72. TEE Prep Data Worksheet (Sheet 5)

(4) Reference numbers 10 and 11 are used to enter logical connectors. If more than one parameter is to be associated with an event, then a logical connector (AND, OR) must be designated for all but the last parameter. Reference numbers 10 and 11 are used for these connectors. When AND is used as a connector, all parameters connected with AND must be met to trigger the event. If OR is used as a connector, any of the parameters connected by OR will trigger the event when it is met.

(5) Reference number 101 is used to clear a line (e.g., 15 TAB 101 clears line 15). When a line which has other lines dependent on it is cleared, the dependent lines are also cleared (e.g.. 16 TAB 101 clears lines, 16, 17. 18 and 19).

g. During TEE preparation functions, the edit area of the CRT page provides operator prompts for data input and error messages for any out-of-range or invalid entries. Numerical inputs via the keyboard are echoed in the edit area with a cursor to indicate the next entry. When TAB is depressed between data fields, the appropriate data input appears on the first line of the edit area (e.g., when 02 TAB is keyed in, the prompt appearing in the edit area states: ENTER TARGET TYPE REFERENCE NUMBER). (Target type reference numbers are listed on the target types list CRT page 951).

NOTE

If an error is made entering in data, an error message appears in the edit area (e.g., ERROR - VALUE OUT OF RANGE). To correct the error, depress the BACKSPACE or CLEAR keys to delete the entry, then insert the correct data.

h. Table 7-14 indicates the procedure required to enter the worksheet data into CRT page 950 and the prompts and data displayed in the edit area. In the entry column are the numbers to be entered plus the appropriate action key (e.g., DISPL, TAB, ENTER). The edit area displays column depicts three line entries to include (Blank) when nothing is shown and a line (_____) for the cursor mark. Lines 02 through 06 accommodate entries for MOTION, PATHWAY, and SPEED. Lines 07 through 11 have no MOTION prompts, so ENTER is keyed in after entering the IR code. After entering all the targets (lines 02 through 11) for a TEE, the triggering contingencies are then entered in lines 12 through 68. The procedure in table 7-14 completes the required entries for the first target type, site associated activity, events, and two triggering contingencies. The process is repeated for each additional target until the TEE prep page is complete.

NOTE

Each time ENTER is keyed in. the data in line 3 of the edit area blanks and the data appears on that numbered line in the main page area of the prep page.

Table 7-14. TEE Prep Data Entry Procedure

Entry	Edit area displays
1. To call up the TEE prep page, enter:	
950	(Blank) 950___ (Blank)
DISPL	(Blank) ___ (Blank)
2. To assign a TEE set number, enter:	
01	(Blank) 01 ___ (Blank)
TAB	ENTER SET NO. 01___ (Blank)

NOTE

Each time TAB is keystroked, a prompt appears in the edit area requesting specific data.

Entry	Edit area displays
01	(Blank) 01 01___ (Blank)
ENTER	(Blank) ___ (Blank)
3. To enter the first target line, enter:	
02	(Blank) 02 ___ (Blank)
TAB	ENTER TARGET TYPE REFERENCE NUMBER 02___ (Blank)
3	ENTER TARGET TYPE REFERENCE NUMBER 02 3 ___ (Blank)

Table 7-14. TEE Prep Data Entry Procedure - Continued

Entry	Edit area displays
TAB	ENTER PATHWAY SPEED (0 - 40 IN INCREMENTS OF 10) 02 3 4 22205 1 1 3 20 T-62 SITE 4 HOS ACT ON 22205 HOT MOTION ON PATH 3
20	ENTER PATHWAY SPEED (0 - 40 IN INCREMENTS OF 10) 02 3 4 22205 1 1 3 20 T-62 SITE 4 HOS ACT ON 22205 HOT MOTION ON PATH 3
ENTER	(Blank) __ (Blank)

NOTE

Step 2. above completes the line entries required for the first target. To enter additional targets in lines 03 through 11, repeat the procedure.

3. To enter the first event for TEE set No. 1, enter:

12	(Blank) 12__ (Blank)
TAB	ENTER SITE NUMBER 12 __ (Blank)
4	ENTER SITE NUMBER 12 4 __ (Blank)
TAB	ENTER TARGET EVENT REFERENCE NUMBER 12 4__ SITE 4
2	ENTER TARGET EVENT REFERENCE NUMBER 12 4 2 __ SITE 4
ENTER	(Blank) __ (Blank)

Table 7-14. TEE Prep Data Entry Procedure - Continued

Entry	Edit area displays
4. To enter triggering contingcies, enter:	
13	(Blank) 13 ___ (Blank)
TAB	ENTER PARAMETER REFERENCE NUMBER 13 ___ (Blank)
3	ENTER PARAMETER REFERENCE NUMBER 13 3 ___ (Blank)
TAB	ENTER OPERATOR REFERENCE NUMBER 13 3 ___ ALT (FT AGL)
9	ENTER OPERATOR REFERENCE NUMBER 13 3 9 ___ ALT (FT AGL)
TAB	ENTER PARAMETER VALUE 13 3 9 ___ ALT (FT AGL) >
20	ENTER PARAMETRE VALUE 13 3 9 20 ___ ALT (FT AGL)>
ENTER	(Blank) ___ (Blank)
14	(Blank) 14 ___ (BlanK)
TAB	ENTER PARAMETE REFERENCE NUMBER 14 ___ (Blank)

Table 7-14. TEE Prep Data Entry Procedure - Continued

Entry	Edit area displays
6	ENTER PARAMETER REFERENCE NUMBER 14 6 _ (Blank)
TAB	ENTER OPERATOR REFERENCE NUMBER 14 6 _ WPNS (RELEASE - SECS)
9	ENTER OPERATOR REFERENCE NUMBER 14 6 9 _ WPNS (RELEASE SECS)
TAB	ENTER PARAMETERVALUE 14 6 9 _ WPNS (RELEASE - SECS) >
5	ENTER PARAMETER VALUE 14 6 9 5 _ WPNS (RELEASE - SECS) >
TAB	ENTER CONNECTOR REFERENCE NUMBER 14 6 9 5 _ WPNS (RELEASE - SECS) >5
10	ENTER CONNECTOR REFERENCE NUMBER 14 6 9 5 10 _ WPNS (RELEASE- SECS) >5
ENTER	(Blank) _ (Blank)

Section IV. SIMULATED MALFUNCTIONS

7-63. GENERAL. There are approximately 336 simulated malfunctions, systematically arranged on 29 CRT pages, available for the CMS. These pages are used to reference the malfunction for selection and possible insertion into the training exercise. Malfuctions are entered into the simulated environment through the data entry keyboard. Categories of available malfunctions are indexed by system on CRT page 200.

a. Active malfunctions are displayed in the status area, and up to six active malfunctions are displayed at one time. Up to 15 malfunctions can be active at a time.

b. Individual malfunctions are coded with a specific 5-digit identifier made up of the number of the CRT page that it appears on (three digits) and the line number (two digits) on that CRT page. Typing the 5-digit identifier and depressing ENTER on the keyboard inserts the malfunction into simulation.

7-64. MALFUNCTION INSERTION. There are two ways of inserting malfunctions into the simulated environment. One is manually, and the other uses automatic malfunction insertion (AMI). There are 15 sets of AMI programs available, with up to 10 malfunctions programmed for each one.

a. During simulation, a selected preprogrammed set of malfunctions can be automatically entered by choosing an AMI before or during training. Up to three different contingent conditions/parameters can be designated for each malfunction. An AMI can be inserted at the IOS CRT via the data entry keyboard.

b. Since the insertion of specific malfunctions is controlled and triggered by conditions that may be beyond instructor control. and the occurrence may disrupt training or overload a trainee at that point, the instructor receives an alert message. Ten seconds prior to insertion of an AMI malfunction, an alert message with the name of the malfunction flashes in the alert area of the CRT display. The instructor has the option at this time to allow the malfunction insertion and to monitor trainee response, or to delete it. If the instructor decides to delete the malfunction, the MALF OVERRIDE switchlight on the forward control panel must be depressed. Depressing the switchlight deletes the impending malfunction for the remainder of the training period without affecting the remainder of the malfunctions in the AMI set. Once an automatic malfunction has been overridden (deleted), if the Instructor desires, it can be inserted manually via the data entry keyboard.

7-65. MALFUNCTI0N DELETION. Active malfunctions can be deleted at any time by either of the following methods:

a. Once Inserted, the malfunction can be removed by reentering the identifier.

b. Active malfunctions can also be removed by depressing the REM0VE ACTIVE MALFS switchlight on the forward control panel.

7-66. CLEARING MALFUNCTI0NS. A11 malfunctions can be cleared by deletion except the ones that trip circuit breakers (CB). Circuit breakers must be manually reset after the malfunction has been deleted. When a CB malfunction is active, the circuit breaker cannot be manually reset.

7-67. MALFUNCTION LIST. Table 7-15 lists the CRT line select numbers and descriptive titles of the available malfunctions. Primarily, the malfunctions are grouped by system in numerical order. Malfunction details In table 7-16 include the malfunction name as It appears on the CRT, the CRT reference number, aircraft indications and related effects, the Indications presented to the instructor and trainee, and any corrective action that is required. The CRT reference number consists of the CRT page number (first three digits) and the CRT page line number (last two digits).

Table 7-15. Malfunctions List

221 Auxiliary Power Unit/Fuel System

Auxiliary Power Unit

22101	APU FAIL
22102	AFU HANG START
22103	APU CNTRL. NG>107
22104	APU FIRE

Fuel Systems

22120	FUEL BOOST PUMP
22121	FUEL XFER PUMP
22122	PLT FUEL QTY IND
22123	FUEL QTY UNBAL
22124	FUEL CROSSFEED
22125	FUEL CONTAMINATE
22126	#l FUEL FTR CLOG
22127	#2 FUEL FTR CLOG
22128	#I1 FUEL PRESSURE
22129	#2 FUEL PRESSURE
22130	REFUEL VALVE OPN

222 Engine Instruments/Environmental Control

Engine Instruments

22201	#l NG IND 0
22202	#2 NC IND 0
22203	#1 OIL PRESS 0
22204	#2 OIL PRESS 0
22205	PILOT NR IND 0
22206	PLT/CPG NR IND 0
22207	#l TGT IND 0
22208	#2 TGT IND 0
22209	PILOT #l TQ 0
22210	PILOT #2 TQ 0
22211	PLT/CPG #1 TQ 0
22212	PLT NPl IND 0
22213	PLT NP2 IND 0
22214	P/G NPl IND 0

Environmental Control

22220	SDC
22221	ECS

Table 7-15. Malfunctions List - Continued

223 Engine Systems

22301	#l NO START	22320	#1 ECU LO
22302	#2 NO START	22321	#2 ECU LO
22303	#l HOT START	22322	#l LD DMD SPNDL
22304	#2 HOT START	22323	#2 LD DMD SPNDL
22305	#l RANG START	22324	#l PWR AVL SPNDL
22306	#2 HANG START	22325	#2 PWR AVL SPNDL
22307	#l FIRE INTERNAL	22326	#1 CMPRESS STALL
22308	X2 FIRE INTERNAL	22327	#2 CMPRESS STALL
22309	#l FIRE EXTERNAL	22328	#l LOSS OF OIL
22310	#2 FIRE EXTERNAL	22329	#2 LOSS OF OIL
22311	#l FLAMEOUT	22330	#l OIL FILTER
22312	#2 FLAMEOUT	22331	#2 OIL FILTER
22313	BOTH FLAMEOUT	22332	#2 CHIPS LIGHT
22314	#l FUEL CONTROL	22333	#1 CHIPS W/FAIL
22315	#2 FUEL CONTROL	22334	#2 CHIPS W/FAIL
22316	#l ALTERNATOR	22335	#1 ACC DRIVE SET
22317	#2 ALTERNATOR	22336	#2 ACC DRIVE SET
22318	#l ECU HI	22337	#l ANTl-ICE
22319	#2 ECU HI	22338	#2 ANTI-ICE

224 Fliqht Controls/ASE/Stabllator

Fliqht Controls

22401	CONTROL FRICTION

ASE

22420	SAS LOSS PITCH
22421	SAS LOSS ROLL
22422	SAS LOSS YAW
22423	SAS ALL CHNLS
22424	SAS ERRATIC
22425	CAS LOSS
22426	BUCS
22427	DASE

Stabilator

22440	AUTO STAB
22441	MANUAL STAB

Table 7-15. Malfunctions List - Continued

225 Transmission/Rotor

Transmission

22501	#l XMSN OIL PRESS
22502	#2 XMSN OIL PRESS
22503	#l XMSN COOLER
22504	#2 XMSN COOLER
22505	#1 OIL QTY LOW
22506	#2 OIL QTY LOW
22507	MAIN XMSN CHIPS
22508	#1 INPT DRIV SFT
22509	#2 INPT DRIV SFT
22510	ACC DRIVE GBX
22511	#l NOSE GBX PUMP
22512	#2 NOSE GBX PUMP
22513	#l NOSE GBX HOT
22514	#2 NOSE GBX HOT
22515	#l NOSE GBX CHIP
22516	#2 NOSE GBX CHIP
22517	GBX VIBRATION
22518	COOLING FAN

Rotor

22520	MRTR OUT OF TRK
22521	MRTR OUT OF BAL
22522	BLADEDAMPER
22523	RTR BK ENG FLT
22524	TLRTR BLADE LOSS
22525	TLRTR GBX LOSS
22526	TRTR THRUST LOSS
22527	TLRTR FIXED
22528	TLRTR OUT OF TRK

226 Electrical/Hydraulic

Electrical

22601	BATTERY RELAY
22602	HOT BATTERY
22603	BATTERY CHARGER
22604	#1 AC GENERATOR
22605	#2 AC GENERATOR
22606	BOTH AC GENS
22607	#l AC CONTACTOR
22608	#2 AC CONTACTOR
226O9	DC CONTACTOR
22610	PLT FLT INST LT
22611	CPG FLT INST LT
22612	#l TRU
22613	#2 TRU
22614	BOTH TRU'S
22615	#l TRU HOT
22616	#2 TRU HOT

Hydraulic

22620	PRI HYD
22621	UTIL HYD
22622	BOTH HYD
22623	PRI HYD OIL LOU
22624	UTIL HYD OIL LOW
22625	PRI HYD FILTER
22626	UTIL HYD FILTER
22627	UTIL ACCUM PRESS
22628	LEFT BRAKE
22629	RIGHT BRAKE
22630	TAILWHEEL LOCK

Table 7-15. Malfunctions List - Continued

227 Pilot Center Circuit Breaker Panel

22701	ASE AC
22702	ASE DC
22703	ASE BUCS
22704	VIB MON
22705	ENG INST
22706	FIRE DETR ENG 1
22707	FIRE DETR ENG 2
22708	FIRE DETR APU
22709	FIRE EXTGH PLT
22710	FIRE EXTGH CPG
22711	FIRE EXTGH APU
22712	FUEL VLV ACTR
22713	FUEL FILL
22714	FUEL AFU
22715	ENG WARN
22716	JETT
22717	LT ANTI COL
22718	LT PRI
22719	LT NAV
22720	LT FORM
22721	LT SRCH LDG
22722	LT SRCH/LDG CNTR
22723	LT CAUT
22724	LT UTIL SEC
22725	EMERG HYD
22726	TRIM
22727	RDR ALT
22728	STBY ATTD
22729	THROT
22730	ENG CUT
22731	ENG LVR
22732	ENG START
22733	FUEL XFEED
22734	FUEL TRANS
22735	FUEL BST
22736	TWHL LOCK
22737	COMM ADF
22738	COMM IFF
22739	COMM KY 58
22740	COMM UHF AM
22741	COMM KY 28
22742	COMMVHF FM
22743	COMM ICS
22744	PITOT HTR
22745	RDR WARN
22746	RTR BRK
22747	AFU HOLD
22748	CHAFF

228 Pilot Forward Circuit Breaker Panel

22801	MISSION JETT
22802	MISSION EL DC
22803	MISSION EL AC
22804	MISSION PNVS DC
22805	MISSION PNVS AC
22806	MISSION SYM GEN
22807	NAV HARS AC
22808	NAV HARS DC
22809	NAV DPLR
22810	RKT ELEX
22811	ARMCONTR
22812	PEN AIDS CONTR
22813	RDR JAM DC
22814	IHADSS
22815	HSI
22816	VDU
22817	FC AC
22818	FC DC
22819	IR JAM PWR
22820	IR JAM XMTR
22821	RDR JAM AC
22822	AIR DATA AC
22823	AIR DATA DC

Table 7-15. Malfunctions List - Continued

229 Pilot Aft Circuit Breaker Panel

22901	ECS FAB FANS
22902	ECS CAB
22903	ECS AFT FAN
22904	STAB AUTO AC
22905	STAB AUTO DC
22906	STAB MAN DC
22907	STAB MAN AC
22908	WSHLD WPR
22909	ICE DET
22910	BLADE DEICE CONT
22911	BLADE DEICE
22912	CNPY ANTIICE CNT
22913	NOSE GRBX HT
22914	ENG ANTI ICE
22915	CANOPY ANTI ICE
22916	PWR XFMR RECT 1
22917	POWER ENG 1
22918	POWER ENG 2
22919	PWR XFMR RECT 2
22920	PWR BATT CHGR AC
22921	PWR BATT CHGR DC

230 CPG Circuit Breakers

CPG No. 1 Panel

23001	PRI LT
23002	CAUT
23003	UTIL SEC LT
23004	ENG INST
23005	VHF AM FM
23006	ICS
23007	MSL ARM
23008	MSL L OUTBD DC
23009	MSL R OUTBD AC
23010	MSL L INBD DC
23011	MSL R INBD AC
23012	MSL DC ELEC
23013	MSL R OUTBD DC
23014	MSL L INBD AC
23015	MSL R INBD DC
23016	MSL L OUTBD AC
23017	FC FCC AC
23018	FC FCC DC
23019	FC RCDR
23020	ATTD IND
23021	AWS AMMO
23022	AWS MTR
23023	AWS AC
23024	AWS DC
23025	MUX L PYL OUTBD
23026	MUX L PYL INBD
23027	MUX R PYL OUTBD
23028	MUX R PYL INBD
23029	MUX FAB L
23030	MUX FAB R
23031	MUX CPG

CPG No. 2 Panel

23032	IHADSS
23033	TADS DC
23034	TADS AC
23035	LASER

Table 7-15. Malfunctions List - Continued

231 Flight Instruments/Communications/Navigtion

Flight Instruments

23101	PITOT TUBE MOIST
23102	TURN INDICATOR
23103	MAGNETIC COMPASS
23104	RADAR ALTIMETER
23105	PILOT ATT IND
23106	STABILATOR IND
23107	ADSS

Communications

23120	VHF XCVR-PLT
23121	VHF XCVR-CPG
23122	UHF XCVR
23123	PLT INTERCOM
23124	CFG INTERCOM
23125	IFF

Navigation

23140	ADF RCVR
23141	ADF BEARING
23142	DOPPLER RTA
23143	DOPPLER SDC PVR
23144	HARS HEADING
23145	HARS
23146	HSI COMPASS CARD
23147	HSI COURSE BAR
23148	ADF TO HSI
23149	LDNS TO HSI
23150	RMI PTR FRZ
23151	ADI-CPG

232 Mission Avionics

Target Acquisition/Designation Sight

23201	TADS
23202	RANGEFINDER
23203	DESIGNATOR
23204	LASER HOT
23205	DTV
23206	TADS-FLIR
23207	TADS-FLIR COOLER
23208	LASER SPOT TRKR
23209	IAT NO LOCK-ON
23210	IMAGE AUTO TRKR
23211	LMC

Pilot Night Vision Sensor

23220	PNVS
23221	PNVS LOCKED
23222	PNVS VIDEO
23223	PNVS AZ DRIVE MTR
23224	PNVS COOLER
23225	SEU
23226	PLT DAP
23227	CPG DAP

Symbol Generator

23240 SYMBOL GENERATOR

Fire Control Computer

23260 FCC

Video Display Unit

23280 VDU

Table 7-15. Malfunctions List - Continued

233 Weapons/Aircraft Survivabllity Equipment

Missiles

23301	HELLFIRE SYSTEM
23302	MISSILE HANGFIRE
23303	MISSILE MISFIRE
23304	MSL UNLATCHED
23305	MSL BIT
23306	L OUTBD LNCHR
23307	L INBD LNCHR
23308	R OUTBD LNCHR
23309	R INBD LNCHR

Gun/Rockets

23310	GUN TURRET JAM
23311	GUN NO FIRE
23312	ARCS
23313	ROCKET HANGFIRE
23314	ROCKETS MISFIRE

Aircraft Survivability Equipment

23320	IR JAMMER
23321	RADAR JAMMER
23322	CHAFF DISPENSER
23323	RDR WARN RCVR

Table 7- 16. Malfunction Details

Required malfunction	Ref number	Aircraft indications and related effects	Corrective act ion	Indications presented to instructor/operator and trainee
APU FAIL	22101	After starting, APU rpm is below minimum requirement.	Noncorrectable	Instructor: APU FAIL appears on CRT. Trainee : APU ON light is off. FAIL APU light illuminates. APU performs an auto shutdown. Fault signal (FD/LS) .
APU HANG START	22102	APU fails to ramp to full rpm value (8216).	Noncorrectable	Instructor: APU HANG START appears on CRT. Trainee: APU START light does not illuminate. FAIL APU light illuminates. Fault signals (FD/LS) Apu start and APU clutch signals (FD/LS)
APU CNTLR. NG>107	22103	APU Ng exceeds design limits and fails to enter auto shutdown.	Noncorrectable	Instructor: NO APU FAIL appears on CRT. Trainee: APU FAIL light is off. No auto shutdown occurs. After 2 minutes (±5.0 seconds . APU fails.
APU FIRE	22104	Fire condition is present in APU compartment.	Noncorrectable	Instructor: APU FIRE appears on CRT. Trainee: APU FIRE PULL HAN DLE. APU FIRE MASTER CAUTION. and MASTER CAUTION lights illuminate.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
FUEL BOOST PUMP	22120	Boost pump fails to pressurize.	Noncorrectable	Instructor: FUEL BOOST PUMP appears on CRT. Trainee: If boost pump was operating prior to insertion of this malfunction, BOOST PHP ON light extinguishes. Engines 1 and 2 startups are not possible.
FUEL XFER	22121	FUEL TRANSFER switch has no control over transfer pump.	Noncorrectable	Instructor: FUEL XFER PUMP appears on CRT. Trainee: Fuel quantity indicators show fuel tank depletion/gain based on position of TRANSFER switch prior to insertion of malfunction. TASK SELECT switch must be used for fuel management.
PLT FUEL QTY IND	22122	Pilot fuel quantity indicator fails.	Noncorrectable	Instructor: PLT FUEL QTY IND appears on CRT. Trainee: Pilot fuel quantity indicator (aft) fails and remains in last position.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
FUEL QTY UNBAL	22123	Unbalanced fuel burning in forward tank after 30 minutes operation (depending on when malfunction is inserted).	Noncorrectable	Instructor: FUEL QTY UNBAL appears on CRT. Trainee : FUEL LOU light illuminates on pilot and CPG caution panels. Fuel quantity gages reflect fuel status.
FUEL CROSSFEED	22124	FUEL CROSSFEED switch has no control over position of crossfeed valve.	Noncorrectable	Instructor: FUEL CROSSFEED appears on CRT. Trainee : Fuel quantity indicators show fuel depletion from appropriate tank based on position prior to insertion of malfunction.
FUEL CONTAMINATE	22125	Unsuccessful fuel use.	Noncorrectable	Instructor : FUEL CONTAMINATE appears on CRT. Trainee : FUEL BYP ENG 1 light illuminates. followed 30 seconds later by FUEL BYP ENG 2. Engine power may fluctuate.
#l FUEL FTR CLOG	22126	Engine 1 fuel filter becomes clogged and is bypassed.	Noncorrectable	Instructor: #l FUEL FTR CLOG appears on CRT. Trainee: Fuel bypass ENG 1 light illuminates.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 FUEL FTR CLOG	22127	Engine 2 fuel filter becomes clogged and is bypassed.	Noncorrectable	Instructor: #2 FUEL FTR CLOG appears on CRT. Trainee: Fuel bypass ENG 2 light illuminates.
#l FUEL PRESSURE	22128	Engine 1 fuel pressure is lost and rate of flow decreases.	Either crewmember can engage boost pump within 15 seconds.	Instructor: #l fUEL PRESSURE appears on CRT. Trainee: Engine 1 flames out if boost pump is not engaged within 15 seconds. If boost pump is engaged, pilot MASTER CAUTION and BOOST PHP ON lights illuminate. and engine 1 runs off boost pump. If engine 1 flames out, pilot and CPG MASTER CAUTION and ENG 1 OUT lights illuminate. All engine 1 instruments settle to zero.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective act ion	Indications presented to instructor/operator and trainee
#2 FUEL PRESSURE	22129	Engine 2 fuel pressure is lost.	Either crewmember can engage boost pump within 15 seconds.	Instructor: #2 FUEL PRES-SURE appears on CRT. Trainee: Engine 2 flames out if boost pump is not engaged within 15 seconds. If boost pump is engaged, pilot MAST-ER CAUTION and BOOST PMP ON lights illuminate, and en-gine 2 runs off boost pump. If engine 2 flames out, pilot and CPG MASTER CAUTION and ENG 2 OUT lights illuminate. All engine 2 instruments settle to zero.
REFUEL VALVE OPN	22130	Refuel valve is open.	Noncorrectable	Instructor: REFUEL VALVE appears on CRT. Trainee: REFUEL VALVE OPEN and RASTER CAUTION lights illuminate.
#l NG IND 0	22201	Engine 1 gas generator stays at or goes to zero.	Noncorrectable	Instructor: #l NC IND 0 appears on CRT. Trainee : If starting engine. indicator remains at zero while engine 1 spools up. If engine is operating nor-mally. indicator decreases to zero while engine con-tinues to operate normally.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 NG IND 0	22202	Engine 2 gas generator stays at or goes to zero.	Noncorrectable	Instructor: #2 NG IND 0 appears on CRT. Trainee: If starting engine. indicator remains at zero while engine 2 spools up. If engine is operating normally, indicator decreases to zero while engine continues to operate normally.
#l OIL PRESS 0	22203	Engine 1 oil pressure indication decreases to zero.	Noncorrectable	Instructor: #l **OIL** PRESS 0 appears on CRT. Trainee: Engine 1 indicated oil pressure decreases to zero. OIL PRESS ENG 1 caution light does not illuminate.
#2 OIL PRESS 0	22204	Engine 2 oil pressure indication decreases to zero.	Noncorrectable	Instructor: X2 OIL PRESS 0 appears on CRT. Trainee: Engine 2 indicated oil pressure decreases to zero. OIL PRESS ENG 1 caution light does not illuminate.

Table 7-16. Halfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective act ion	Indications presented to instructor/operator and trainee
PILOT NR IND 0	22205	Pilot rotor tachometer decreases to zero.	Noncorrectable	<u>Instructor</u>: PILOT NR IND 0 appears on CRT. <u>Trainee</u>: Pilot indicated rotor tachometer decreases to zero.
PLT/CPG NR IND 0	22206	Rotor tachometers fluctuate and decrease to zero.	Noncorrectable	<u>Instructor</u>: PLT/CPG NR IND appears on CRT. <u>Trainee</u>: Rotor tachometer fluctuates for 30 seconds and then decreases to zero.
#l TGT IND 0	22207	Engine 1 turbine gas temperature indicator decreases to zero.	Noncorrectable	<u>Instructor</u>: #l TGT IND 0 appears on CRT. <u>Trainee</u>: Engine 1 indicated engine turbine gas temperature decreases to zero.
#2 TGT IND 0	22208	Engine 2 turbine gas temperature indicator decreases to zero.	Noncorrectable	<u>Instructor</u>: #2 TGT IND 0 appears on CRT. <u>Trainee</u>: Engine 2 indicated engine turbine gas temperature decreases to zero.
PILOT #l TQ 0	22209	Engine 1 torque indicator decreases to zero.	Noncorrectable	<u>Instructor</u>: PILOT #l TQ 0 appears on CRT. <u>Trainee</u>: Engine 1 torque indicator decreases to zero.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
PILOT #2 TQ 0	22210	Engine 2 torque indicator decreases to zero.	Noncorrectable	Instructor: PILOT #2 TQ 0 appears on CRT. Trainee: Engine 2 torque indicator decreases to zero.
PLT/CPG #1 TQ 0	22211	Engine 1 torque indicator decreases to zero for both crewmembers.	Noncorrectable	Instructor: PLT/CFG #1 TQ 0 appears on CRT. Trainee: Engine 1 torque indicator decreases to zero.
PLT NP1 IND 0	22212	Pilot NP1 indicator drops to zero.	Noncorrectable	Instructor: PLT NP1 IND 0 appears on CRT. Trainee: Engine 1 NP indicator in pilot cockpit drops to zero.
PLT NP2 IND 0	22213	Pilot NP2 indicator drops to zero.	Noncorrectable	Instructor: PLT NP2 IND 0 appears on CRT. Trainee: Engine 2 NP indicator in pilot cockpit drops to zero.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
P/G NP1 IND 0	22211	Engine 1 pilot and CPG NP indicators drop to zero.	Noncorrectable	Instructor: P/G NP1 IND 0 appears on CRT. Trainee: Engine 1 NP indicator in pilot and CPG cockpits drop to zero. Both indicators drop simultaneously in integrated mode. In independent mode, only active indicator drops.
SDC	22220	Pressurized air from SDC compressor not available.	Noncorrectable	Instructor: SDC appears on CRT. Trainee: SHAFT DRIVEN COMP and MASTER CAUTION lights illuminate. (Air still flows to simulator to avoid damage to equipment.)
ECS	22221	Pressurized air from ECS not available.	Noncorrectable	Instructor : ECS FAIL appears on CRT. Trainee: ECS and MASTER CAUTION lights illuminate. (Air still flows to simulator to avoid damage to equipment.)

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#l NO START	22301	Starter circuit breaker Pops .	Noncorrectable	Instructor: #1 NO START appears on CRT. Trainee: Starter circuit breaker pops. If NG is 40% or greater, there is no further effect. If NG is less than 40%. NG decreases to zero, and ENG 1 light above ENG START switch extinguishes.
#2 No START	22302	Starter circuit breaker pops.	Noncorrectable	Instructor: #2 NO START appears on CRT. Trainee: Starter circuit breaker pops. If NG is 40% or greater, there is no further effect. If NG is less than 40%. NG decreases to zero, and ENG 2 light above ENG START switch extinguishes.
#l HOT START	22303	Engine 1 lights and accelerates normally but stabilizes below idle conditions. TGT begins to rise at 1.5 times normal rate.	886°C not exceeded if abort procedures initiated in time to correct HOT START	Instructor: #l HOT START appears on CRT. Trainee: NG increases to about 40%. then decreases to 37 (±5)%. TGT increases 1.5 times normal rate and exceeds 886°C on engine 1 if corrective action not taken.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 HOT START	22304	Engine 2 lights and accelerates normally but stabilizes below idle condit ions. TGT begins to rise at 1.5 times normal rate.	886°C not exceeded if abort procedures initiated in time to correct HOT START.	Instructor: #2 HOT START appears on CRT. Trainee: NG increases to about 40%. then decreases to 37 (±5N. TGT increases 1.5 times normal rate and exceeds 886°C on engine 2 if corrective action not taken.
#1 HANG START	22305	Engine 1 lights normally and accelerates but stabilizes below normal idle speed and engine 1 TGT stabilizes below starting limit.	Noncorrectable	Instructor: #1 HANG START appears on CRT. Trainee : Engine 1 NG hangs around 40 (+5)% and TGT hangs about 35O°C (+20%).
#2 HANG START	22306	Engine 2 lights normally and accelerates but stabilizes below normal idle speed and engine 2 TGT stabilizes below starting limit.	Noncorrectable	Instructor: #2 HANG START appears on CRT. Trainee: Engine 2 NG hangs around 40 (+5)% and TGT hangs about 35O°C (±20%).
#l FIRE INTERNAL	22307	TGT increases above 886° C.	Noncorrectable	Instructor: #l FIRE INTERNAL appears on CRT. Trainee: Engine 1 TGT increases above 886°C.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 FIRE INTERNAL	22308	TGT increases above 886° C.	Noncorrectable	Instructor: #2 FIRE INTERNAL appears on CRT. Trainee: Engine 2 TGT increases above 886°C.
#l FIRE EXTERNAL	22309	Fire condition is present in engine 1 bay.	Noncorrectable	Instructor: #1 FIRE EXTERNAL appears on CRT. Trainee: Engine 1 FIRE PULL HANDLE light illuminates.
#2 FIRE EXTERNAL	22310	Fire condition is present in engine 2 bay.	Noncorrectable	Instructor: #2 FIRE INTERNAL appears on CRT. Trainee : Engine 2 FIRE PULL HANDLE light illuminates.
#l FLAMEOUT	22311	Engine 1 flames out due to momentary fuel stoppage. Malfunction is deactivated after engine 1 PCL is moved to IDLE.	Pilot must perform an in-the-air engine restart	Instructor: #l FLAMEOUT appears on CRT. Trainee : Sudden reduction in engine noise, NG, TGT, NP. oil pressure, and engine torque for engine 1. When NG reaches 55%. ENG OUT, ENGINE 1, and ENG OIL PRESS warning lights and MASTER CAUTION light illuminate.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 FLAMEOUT	22312	Engine 2 flames out due to momentary fuel stoppage. Malfunction is deactivated after engine 2 PCL is moved to IDLE.	Pilot must perform an in-the-air engine restart	Instructor: #2 FLAMEOUT appears on CRT. Trainee : Sudden reduction in engine noise, NG, TGT, NP. oil pressure. and engine torque for engine 2. When NG reaches 55%. ENG OUT, ENGINE 2, and ENG OIL PRESS warning lights and MASTER CAUTION light illuminate.
BOTH FLAMEOUT	22313	Both engines flame out due to momentary fuel stoppage. Malfunction is deactivated after both engine PCL's are moved to IDLE.	Pilot must perform an in- the-air engine restart	Instructor: BOTH FLAMEOUT appears on CRT. Trainee: Sudden reduction in engine noise. NG, TGT, NP. oil pressure. and engine torque for both engines. When NG reaches 55%. ENG OUT, ENGINE 2, and ENG OIL PRESS warning lights, and MASTER CAUTION light illuminate.
#l FUEL CONTROL	22314	Engine 1 HMU fails closed.	Noncorrectable	Instructor: #l FUEL CONTROL appears on CRT. Trainee: Sudden reduction in engine noise. NG. TGT, NP, oil pressure, and engine torque for engine 1. When NG reaches 55%. ENG OUT, ENG OIL PRESS, ENG 1, and MASTER CAUTION lights illuminate.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 FUEL CONTROL	22315	Engine 2 HMU fails closed.	Noncorrectable	Instructor: #12 FUEL CONTROL appears on CRT. Trainee: Sudden reduction in engine noise, NG, TNT, NP. oil pressure, and engine torque for engine 2. When NG reaches 55%. ENG OUT, ENG OIL PRESS, ENG 2, and MASTER CAUTION lights illuminate.
#1 ALTERNATOR	22316	Loss of engine 1 alternator.	Noncorrectable	Instructor: #l ALTERNATOR appears on CRT. Trainee : ENGINE 1 OUT and MASTER CAUTION lights illuminate. Engine 1 turbine speed, torque, and gas generator speed indicators decrease to zero. All engine 1 ECU functions are lost except turbine overspeed protection and gas generator speed limiting.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 ALTERNATOR	22317	Loss of engine 2 alterna tor.	Noncorrectable	Instructor: #2 ALTERNATOR appears on CRT. Trainee: Engine 2 OUT and MASTER CAUTION lights illu- minate. Engine 2 turbine speed, torque. and gas gener- ator speed indicators de- crease to zero. All engine 2 ECU functions are lost except turbine overspeed protection and gas generator speed limiting.
#l ECU HI	22318	Engine 1 ECU power turbine reference speed goes to 104.5 (±2)%.	Noncorrectable	Instructor: #l ECU HI ap- pears on CRT. Trainee: If engine 1 is op- erating independently. en- gine 1 power turbine and main rotor speed increases to 104 (±2)%. HIGH RPM ROTOR and RASTER CAUTION lights illuminates. If both engines are operating, en- gine 1 power turbine speed increases to 104 (±2)%, and main rotor speed increases to 102 (+2)%.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 ECU HI	22319	Engine 2 ECU power turbine reference speed goes to 104.5 (±2)%.	Noncorrectable	Instructor: #2 ECU HI appears on CRT. Trainee: If engine 2 is operating independently. engine 2 power turbine and main rotor speed increases to 104 (±2)%. HIGH RPM ROTOR and MASTER CAUTION lights illuminate. If both engines are operating, engine 2 power turbine speed increases to 104 (±2)%. and main rotor speed increases to 102 (+2)%.
#l ECU LO	22320	Engine 1 ECU power turbine reference speed goes to 90 (+2)%.	Noncorrectable	Instructor: #1 ECU LOU appears on CRT. Trainee: If engine 1 is operating independently, engine 1 power turbine and main rotor speed decreases to 90 (±2)%. LOW RPM MOTOR and MASTER CAUTION lights illuminate. If both engines are operating. engine 1 power turbine speed decreases to 90 (+2)%, but main rotor speed remains at 100 (±2)%.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 ECU LO	22321	Engine 2 ECU power turbine reference speed goes to 90 (±2)%.	Noncorrectable	Instructor: #2 ECU LOW appears on CRT. Trainee: If engine 2 is operating independently. engine 2 power turbine and main rotor speed decreases to 90 (±2)%. LOW RPM MOTOR and MASTER CAUTION lights illuminate. If both engines are operating, engine 2 power turbine speed decreases to 90 (±2)%, but main rotor speed remains at 100 (±2)%.
#l LD DMD SPNDL	22322	Failure in load demand spindle linkage for engine 1. Control of power supplied is lost.	Power lever can be used to prevent overspeed if power required is less than min ECU trim at LDS setting available.	Instructor: #l LD DMD SPNDL appears on CRT. Trainee: Engine 1 responds more slowly to changes in power requirements within limit of ECU trim. No change in collective force.
#2 LD DMD SPNDL	22323	Failure In load demand spindle linkage for engine 2. Control of power supplied is lost.	Power lever can be used to prevent overspeed if power required is less than min ECU trim at LDS setting available.	Instructor: #2 LD DMD SPNDL appears on CRT. Trainee: Engine 2 responds more slowly to changes in power requirements within limit of ECU trim. No change in collective force.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#l PWR AVL SPNDL	22324	Failure in power available spindle linkaye for engine 1.	Noncorrectable	Instructor: #1 PWR AVL SPNDL appears on CRT. Trainee: Power available from engine 1 remains constant with change in PLC setting. No change in PLC force.
#2 PWR AVL SPNDL	22325	Failure in power available spindle linkage for engine 2.	Noncorrectable	Instructor: #2 PWR AVL SPNDL appears on CRT. Trainee: Power available from engine 2 remains constant with change in PLC setting. No change in PLC force.
#l CMPRESS STALL	22326	NG actuator fails and engine compressor section stalls when engine torque is above 65%.	Noncorrectable	Instructor: #l CMPRESS STALL appears on CRT. Trainee: Noticeable bangs heard. Engine response erratic. TGT, NG, NP, and engine torque fluctuate for 15 seconds. When NG reaches 55%, engine goes out and OIL PRESS ENG 1 and MASTER CAUTION lights illuminate.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective act ion	Indications presented to instructor/operator and trainee
#2 CMPRESS STALL	22327	NG actuator fails and engine compressor section stalls when engine torque is above 65%.	Noncorrectable	Instructor: #2 CHPRESS STALL appears on CRT. Trainee: Noticeable bangs heard. Engine response erratic. TGT, NG, NP, and engine torque fluctuate for 15 seconds. When NG reaches 55%. engine goes out and OIL PRESS ENG 1 and MASTER CAUTION lights illuminate.
#l LOSS OF OIL	22328	Engine 1 oil pressure decreases to zero and subsequent engine seizure occurs.	Noncorrectable	Instructor: #l LOSS OF OIL appears on CRT. Trainee: Engine 1 oil pressure drops to zero in approximately 15 seconds. At 27.5 psi, yellow gage lamp segment lights. At 22.5 psi, red gage lamp segment lights. At 0 psi, OIL PSI ENG 1 caution light illuminates. After 15 seconds, engine 1 fails, with sudden drop in NG, TGT, NP, and engine torque. When engine 1 NG reaches 55%. ENGINE 1 out. ENG 1 warning, and MASTER CAUTION lights illuminate.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 LOSS OF OIL	22329	Engine 2 oil pressure decreases to zero.	Noncorrectable	Instructor: #2 LOSS OF OIL appears on CRT. <u>Trainee</u>: Engine 2 oil pressure drops to zero in approximately 15 seconds. At 27.5 psi, yellow gage lamp segment lights. At 0 psi, OIL PSI ENG 2 caution light illuminates. After 15 seconds, engine 2 fails, with sudden drop in NG, TGT, NP, and engine torque. When engine 2 NG reaches 55%. ENGINE 2 out, ENG 2 warning, and MASTER CAUTION lights illuminate.
#l OIL FILTER	22330	Engine 1 oil pressure too high.	Noncorrectable	<u>Instructor</u>: #l OIL FILTER appears on CRT. <u>Trainee</u>: Pilot and CPG MASTER CAUTION, pilot OIL BYP ENG 1, and CPG engine 1 CAUTION lights illuminate.
#2 OIL FILTER	22331	Engine 2 oil pressure too high.	Noncorrectable	<u>Instructor</u>: #2 OIL FILTER appears on CRT. <u>Trainee</u>: Pilot and CPG MASTER CAUTION. pilot OIL BYP ENG 2, and CPG engine 1 CAUTION lights illuminate.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 CHIPS LIGHT	22332	CHIPS ENG 2 caution light illuminates.	Noncorrectable	Instructor: #2 CHIPS LIGHT appears on CRT. Trainee: CHIPS ENG #2 and MASTER CAUTION lights illuminate.
#l CHIPS U/FAIL	22333	Metal chips are detected in oil for engine 1.	Noncorrectable	Instructor: #l CHIPS W/FAIL appears on CRT. Trainee : CHIPS ENG #1 and MASTER CAUTION lights illuminate. Engine 1 power fluctuates, 45 seconds after CHIPS light illuminates. After 1 (±O.5) minutes, engine 1 failure occurs.
X2 CHIPS U/FAIL	22334	Metal chips are detected in oil for engine 2.	Noncorrectable	Instructor: #2 CHIPS W/FAIL appears on CRT. Trainee: CHIPS ENG #2 and MASTER CAUTION lights illuminate. Engine 2 power fluctuates 45 seconds after CHIPS light illuminates. After 1 (±0.5) minutes. engine 2 failure occurs.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#l ACC DRIVE SET	22335	#l accessory drive shaft fails and drive functions (such as oil pressure. NG indication. and NG sensor signals) are lost.	Noncorrectable	Instructor: #1 ACC DRIVE SET appears on CRT. Trainee: Engine 1 main power ECU is lost. NG indicator goes to zero in 10 (±l) seconds for both pilot and CPG. NG sensor signal is lost, and oil pressure decreases to zero for engine 1. OIL PRESS ENG 1 and MASTER CAUTION lights illuminate.
#2 ACC DRIVE SET	22336	#2 accessory drive fails and drive functions (such as oil pressure, NG indication, and NG sensor signals) are lost.	Noncorrectable	Instructor: #2 ACC DRIVE SST appears on CRT. Trainee: Engine 2 main power ECU is lost. NG indicator goes to zero in 10 (±l) seconds for both pilot and CPG. NG sensor signal is lost. and oil pressure decreases to zero for engine 2. OIL PRESS ENG 2 and MASTER CAUTION lights illuminate.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#l ANTI-ICE	22337	Engine 1 nose gearbox heat er is overheated and in creasing.	Noncorrectable	Instructor: #l ANTI-ICE appears on CRT. Trainee : MASTER CAUTION at both stations, pilot ENG 1 ANTI-ICE, and CPG ENG ANTI-ICE lights illuminate.
#2 ANTI-ICE	22338	Engine 2 nose gearbox heat er is overheated and in-creasing.	Noncorrectable	Instructor: #2 ANTI-ICE appears on CRT. Trainee: MASTER CAUTION at both stations. pilot ENG 2 ANTI-ICE and CPG ENG ANTI-ICE lights illuminate.
CONTROL FRICTION	22401	Control friction failures.	Noncorrectable	Instructor : CONTROL FRICTION appears on CRT. Trainee: Collective stick creeps during flight.
SAS LOSS PITCH	22420	Loss of stability augmentation system in pitch axis.	Noncorrectable	Instructor: SAS LOSS PITCH appears on CRT. Trainee: ASE warning light illuminates. ASE PITCH switch drops to off.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
SAS LOSS ROLL	22421	Loss of stability augmentation system in roll axis.	Noncorrectable	<u>Instructor</u>: SAS LOSS ROLL appears on CRT. <u>Trainee</u>: ASE warning light illuminates. ASE ROLL switch drops to off.
SAS LOSS YAW	22422	Loss of stability augmentation system in yaw axis.	Noncorrectable	<u>Instructor</u>: SAS LOSS YAW appears on CRT. <u>Trainee</u>: ASE warning light illuminates. ASE YAW switch drops to off.
SAS ALL CHNLS	22423	Loss of stability augmentation system in all channels.	Noncorrectable	<u>Instructor</u>: SAS ALL CHNLS appears on CRT. <u>Trainee</u>: Switches on DASE panel drop to off. SAS and MASTER CAUTION lights illuinate at pilot station.
SAS ERRATIC	22424	Erratic flight augmentation.	Noncorrectable	<u>Instructor</u>: SAS ERRATIC appears on CRT. <u>Trainee</u>: Erratic flight augmentation within envelope of augmentation performance.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
CAS LOSS	22425	Loss of command augmentation system.	Disengage SAS	Instructor: CAS LOSS appears on CRT. Trainee: Pitch. roll. and yaw inputs no longer augmented. Aircraft control is sluggish.
BUCS	22426	BUCS failure	Noncorrectable	Instructor: BUCS appears on CRT. Trainee: BUC FAIL light illuminates.
DASE	22427	DASE ceases to function.	Noncorrectable	Instructor: DASE appears on CRT. Trainee: DASE panel switches drop to off. ASE and MASTER CAUTION lights illuminate in pilot station. If a BUCS malfunction, BUCS capabilities are lost.
AUTO STAB	22440	Stabilator automatic mode failure.	Noncorrectable	Instructor: AUTO STAB appears on CRT. Trainee: MAN STAB and MASTER CAUTION lights illuminate. Stabilator angle of incidence only changes manually. Stabilator fail audio is activated .

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
MANUAL STAB	22441	Stabilator manual mode failure.	Noncorrectable	Instructor: MANUAL STAB appears on CRT. Trainee: Stabilator position no longer responds to STABILATOR MANUAL CONTROL switches.
#1 XMSN OIL PRESS	22501	No. 1 transmission oil pump failure.	Noncorrectable	Instructor: #l XMSN OIL PRESS appears on CRT. Trainee: OIL PRES MNXHSN 1 light illuminates. Oil pressure main transmission 1 decreases to zero.
#2 XMSN OIL PRESS	22502	No. 2 transmission oil pump failure.	Noncorrectable	Instructor: #2 XMSN OIL PRESS appears on CRT. Trainee: OIL PRES MNXMSN 2 light illuminates. Oil pressure main transmission 2 decreases to zero.
#l XMSN COOLER	22503	Transmission No. 1 cooler failure causes oil temperature to go out of limits.	Noncorrectable	Instructor: #l MHSN COOLER appears on CRT. Trainee : OIL PRES MNXMSN 1 light illuminates.

Table 7-16. Malfunction Details - continued

Required malfunction	Ref number	Aircraft indications and related effects	corrective action	Indications presented to instructor/operator and trainee
#2 XMSN COOLER	22504	Transmission No. 2 cooler failure causes oil temperature to go out of limits.	Noncorrectable	Instructor: #2 XMSN COOLER appears on CRT. Trainee: OIL PRES MNXMSN 2 light illuminates.
#1 OIL QTY LOW	22505	No.1 transmission oil low	Noncorrectable	Instructor: #l OIL QTY LOW appears on CRT. Trainee : MASTER CAUTION light illuminates. XMSN 1 CPG illuminates concurrent with either OIL PSI MAIN 1 or OIL HOT MAIN XMSN 1.
#2 OIL QTY LOW	22506	No.2 transmission oil low	Noncorrectable	Instructor: #2 OIL QTY LOW appears on CRT. Trainee: MASTER CAUTION light illuminates. XMSN 2 CPG illuminates concurrent with either OIL PSI MAIN 2 or OIL HOT MAIN XMSN 2.
MAIN XMSN CHIPS	22507	Metal chips are detected in main transmission.	Noncorrectable	Instructor : MAIN XMSN CHIPS appears on CRT. Trainee: CHIPS MAIN XMSN light illuminates on pilot and CPG panels.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#1 INPT DRIV SFT	22508	Input driveshaft from engine 1 nose gear box to #1 main transmission fails.	Noncorrectable	Instructor: #1 INPT DRIV SFT appears on CRT. Trainee: Power turbine torque from engine 1 is lost. Power turbine speed increases rapidly to maximum and then shuts down automatically when NP overspeed control is triggered.
#2 INPT DRIV SFT	22509	Input driveshaft from engine 2 nose gearbox to #2 main transmission fails.	Noncorrectable	Instructor: #2 INPT DRIV SFT appears on CRT. Trainee: Power turbine torque from engine 2 is lost. Power turbine speed increases rapidly to maximum and then shuts down automatically when NP overspeed control is triggered.
ACC DRIVE GBX	22510	This oil pump failure results in accessory gears not being lubricated when APU or main transmission is operating.	Noncorrectable	Instructor: ACC DRIVE GBX appears on CRT. Trainee: MASTER CAUTION and OIL PSI ACC lights illuminate.

Table 7- 16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#1 NOSE GBX PUMP	22511	Failure of No. 1 nose gear box pump.	Noncorrectable	Instructor: #1 NOSE GBX PUMP appears on CRT. Trainee: OIL PRESS NS GRBX1 light illuminates. Oil pressure #1 nose gearbox decreases to zero.
#2 NOSE GBX PUMP	22512	Failure of No. 2 nose gear box pump.	Noncorrectable	Instructor: #2 NOSE GBX PUMP appears on CRT. Trainee : OIL PRESS NS GRBX2 light illuminates. Oil pressure in #2 nose gearbox decreases to zero.
#1 NOSE GBX HOT	22513	No. 1 nose gearbox oil temperature exceeds 284°.	Noncorrectable	Instructor: #1 NOSE GBX HOT appears on CRT. Trainee: Pilot OIL HOT NOSE GRBX1 and MASTER CAUTION lights illuminate. CPG ENG 1 light illuminates.
#2 NOSE GBX HOT	22514	No. 2 nose gearbox oil temperature exceeds 284°.	Noncorrectable	Instructor: #2 NOSE GBX HOT appears on CRT. Trainee: OIL HOT NOSE GRBX2 and MASTER CAUTION lights illuminate. CPG ENG 2 light illuminates.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#1 NOSE GBX CHIP	22515	Metal chips detected in No. 1 nose gearbox pump.	Noncorrectable	Instructor: #1 NOSE GBX CHIP appears on CRT. Trainee: CHIP NOSE GRBX1 and ENGINE 1 lights illuminate.
#2 NOSE GBX CHIP	22516	Metal chips detected in No. 2 nose gearbox pump.	Noncorrectable	Instructor: #2 NOSE GBX CHIP appears on CRT. Trainee: CHIP NOSE GRBX2 and ENGINE 2 lights illuminate.
GBX VIBRATION	22517	Gearbox vibrates.	Noncorrectable	Instructor: GBX VIBRATION appears on CRT. Trainee: MASTER CAUTION and VIB GRBX lights illuminate at both cockpits. Directional controls vibrate.
COOLING FAN	22518	Intermediate and tail gearbox cooling fan failure.	Noncorrectable	Instructor: COOLING FAN appears on CRT. Trainee: TEMP TR and TEMP INT lights illuminate in both cockpits.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
MRTR OUT OF TRK	22520	One blade flaps at a different angle from the others due to structural warping or bending.	Noncorrectable	Instructor: MRTR OUT OF TRK appears on CRT. Trainee: Motion indicating cycling pitch and roll oscillation at main rotor frequency.
MRTR OUT OF BAL	22521	Center-of-gravity of rotor does not coincide with center of hub due to broken blade or other mass imbalance.	Noncorrectable	Instructor: MRTR OUT OF BAL appears on CRT. Trainee: Severe vibration at rotor frequency transmitted via motion.
BLADE DAMPER	22522	Blade damper for main rotor becomes inoperative due to separation of bonded rubber from either inside or outside plates of damper.	Noncorrectable	Instructor: BLADE DAMPER appears on CRT. Trainee Lateral oscillation ranging in frequency from 0 to 5 Hz proportional to main rotor rpm. Amplitude of oscillation is ±0.2 inch.
RTR BK ENG FLT	22523	Rotor brake engaged in flight.	Noncorrectable	Instructor. RTR BK ENG FLT appears on CRT. Trainee: ROTOR BRAKE caution light illuminates.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
TLRTR BLADE LOSS	22524	All of tail rotor blades gone.	Noncorrectable	Instructor: TLRTR BLADE LOSS appears on CRT. Trainee: No directional control authority. Pitch down due to weight loss. Severe vibration occurs for 2 seconds before gearbox separation. TAIL GBX or INTMD GRBX, VIB GRBX, and TRMPTR lights illuminate.
TLRTR GBX LOSS	22525	Tail rotor gearbox, blades, and controls lost.	Noncorrectable	Instructor: TLRTR GBX LOSS appears on CRT. Trainee: TRMP, INT, VIB GRBX, and TEMP TR lights illuminate. Severe vibration occurs for 2 seconds before gearbox separation. No directional control authority. Pitch down due to weight loss.
TRTR THRUST LOSS	22526	Tail rotor does not function; i.e.. no spinning.	Noncorrectable	Instructor: TRTR THRUST LOSS appears on CRT. Trainee: Complete loss of directional control.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
TLRTR FIXED	22527	Pitch of tail rotor remains fixed.	Noncorrectable	Instructor: TLRTR FIXED appears on CRT. Trainee : Pedals continue to move with no effect on tail rotor thrust.
TLRTR OUT OF TRK	22528	One blade rotates out of normal plane of rotation of tail rotor due to structural warping or bending .	Noncorrectable	Instructor: MRTR OUT OF TRK appears on CRT. Trainee: Oscillations at tail rotor.
BATTERY RELAY	22601	Battery power not available.	Noncorrectable	Instructor: BATTERY RELAY appears on CRT. Trainee: Emergency battery power is not available when required. When battery is only source of power, these systems are lost.
HOT BATTERY	22602	Temperature reaches 54° to 60°C or cell dissimilarity exists.	Noncorrectable	Instructor: HOT BATTERY appears on CRT. Trainee: HOT BATTERY caution light illuminates.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
BATTERY CHARGER	22603	Battery charger not functional.	Noncorrectable	Instructor: BATTERY CHARGER appears on CRT. Trainee: CHARGER and MASTER CAUTION lights illuminate.
#1 AC GENERATOR	22604	Loss of output from one generator.	Noncorrectable	Instructor: #1 AC GENERATOR appears on CRT. Trainee: GEN 1 caution light illuminates. (Also see #2 AC GENERATOR).
#2 AC GENERATOR	22605	Loss of output from one generator.	Noncorrectable	Instructor: #2 AC GENERATOR appears on CRT. Trainee: GEN 2 caution light illuminates. If both GEN 1 and GEN 2 are failed, MASTER CAUTION lights at both stations illuminate. Pilot GEN 1. GEN 2, RECT 1, RECT 2, and battery charger caution lights illuminate. CPG ELEC SYS FAIL lights illuminate. Generator power is lost. Battery emergency bus system remains active for 12 minutes.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
BOTH AC GENS	22606	Loss of output from both generators.	Noncorrectable	Instructor: BOTH AC GENS appears on CRT. Trainee : GEN 1, GEN 2, FAIL ELECT, RECT 1, RECT 2, and battery charger CAUTION lights illuminate. Generator power is lost. Battery emergency bus system remains active for 12 minutes.
#1 AC CONTACTOR	22607	Loss of ac bus 1.	Noncorrectable	Instructor: #1 AC CONTACTOR appears on CRT. Trainee: Loss of power available to subfunction tied to ac bus 1. RECT 1 light illuminates.
#2 AC CONTACTOR	22608	Loss of ac bus 2.	Noncorrectable	Instructor: #2 AC CONTACTOR appears on CRT. Trainee: Loss of power available to subfunction tied to ac bus 2. RECT 2 caution light illuminates.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
DC CONTACTOR	22609	Loss of power to dc busses 1, 2, and 3.	Noncorrectable	Instructor: DC CONTACTOR appears on CRT. Trainee: CHARGER CAUTION and FAIL ELECT lights illuminate. Loss of power available to subfunctions tied to dc essential busses 1, 2, or 3. Battery emergency bus powered systems remain active for 12 minutes.
PLT FLT INST LT	22610	Loss of lighting	Noncorrectable	Instructor: PLT FLT INST LT appears on CRT. Trainee: Loss of lighting to the following systems: video display, clock, stabilator placard, radio placard, turn-and-slip indicator, barometric altimeter, vertical speed indicator, and accelerometer.

Table 7-16. Malfunction Details continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
CPG FLT INST LT	22611	Loss of lighting.	Noncorrectable	Instructor: CPG FLT INST LT appears on CRT. Trainee: Loss of lighting to the following systems: attitude indicator, CPG clock, vertical speed indicator, radio magnetic indicator, barometric altimeter, caution/warning panel.
#1 TRU	22612	Loss of output from #1 TRANS/RECT with failure of either TRANS/RECT.	Noncorrectable	Instructor: #1 TRU appears on CRT. Trainee: RECT 1 and MASTER CAUTION lights illuminate. If both #1 and #2 TRU's are failed, RECT 1, RECT 2, CHARGER CAUTION, ELEC SYS FAIL, and MASTER CAUTION lights illuminate. All dc essential busses are lost. Battery emergency bus system remains active for 12 minutes.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#2 TRU	22613	Loss of output from #2 TRANS/RECT with failure of either TRANS/RECT.	Noncorrectable	Instructor: #2 TRU appears on CRT. Trainee: MASTER CAUTION and RECT 2 caution lights illuminate. If both #1 and #2 TRU's are failed, RECT 1, RECT 2, CHARGER CAUTION, ELEC SYS FAIL, and MASTER CAUTION lights illuminate. All dc essential busses are lost. Battery emergency bus system remains active for 12 minutes.
BOTH TRU'S	22614	Loss of all dc essential busses and associated power available.	Noncorrectable	Instructor: BOTH TRW's appears on CRT. Trainee: RECT 1, RECT 2. CHARGER CAUTION, and FAIL ELECT lights illuminate. All dc essential busses are lost. Battery emergency bus system remains active for 12 minutes.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
#1 TRU HOT	22615	Rectifier fan for #1 TRU fails.	Pilot can pull XFMR RECT #1 CB.	Instructor: #1 TRU HOT appears on CRT. Trainee: HOT RECT 1 and MASTER CAUTION lights illuminate. If pilot pulls XFMR RECT #1 CB, No. 1 TRU shuts down. Load transfers to #2 TRU. Pilot HOT RECT 1 light then extinguishes and RECT 1 light illuminates.
#2 TRU HOT	22616	Rectifier fan for #2 TRU fails.	Pilot can pull XFER RECT #2 CB.	Instructor: #2 TRU HOT appears on CRT. Trainee: HOT RECT 2 and MASTER CAUTION lights illuminate. If pilot pulls XFMR RECT #2 CB, No. 2 TRU shuts down. Load transfers to #1 TRU. Pilot HOT RECT 2 light then extinguishes and RECT 2 light illuminates.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
PRI HYD	22620	Loss of primary hydraulic system.	Noncorrectable	Instructor: PRI HYD appears on CRT. Trainee: Servo actuators For DASE and BUCS are lost. OIL PRES PRI HYD light illuminates. HYD PRESS gage goes to zero in approximately 1 second. OIL LOW PRI HYD and MASTER CAUTION lights illuminate at both pilot and CPG stations.
UTIL HYD	22621	Loss of utility hydraulic systems.	Noncorrectable	Instructor: UTIL HYD appears on CRT. Trainee: Hydraulic pressure lost to area weapon. external stores, tailwheel lock, and ammo carrier drive. HYD PRES UTL gage goes to zero in approximately 1 second. Pilot OIL PRESS UTL HYD, OIL LOW UTL HYD, and MASTER CAUTION lights illuminate. CPG UTL HYD and MASTER CAUTION lights illuminate. Emergency hydraulic accumulator depletes if pilot or CPG EMER HYD switch is ON.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
BOTH HYD	22622	Loss of both primary and utility systems.	Set EMERGENCY HYDRAULIC switch to on when collective or cyclic control is needed and off when not.	<u>Instructor:</u> BOTH HYD appears on CRT. <u>Trainee</u>: OIL PRES PRI HYD and OIL PRES UTL HYD lights illuminate. Both gages go to zero in 1 second. Loss of pressure same as with individual system.
PRI HYD OIL LOW	22623	Primary system hydraulic fluid is at minimum operating level.	Noncorrectable	<u>Instructor:</u> PRI HYD OIL LOW appears on CRT. <u>Trainee:</u> OIL LOW PRI HYD and MASTER CAUTION lights illuminate.
UTIL HYD OIL LOW	22624	Utility system hydraulic fluid is at minimum operating level.	Noncorrectable	<u>Instructor:</u> UTIL HYD OIL LOW appears on CRT. <u>Trainee:</u> OIL LOW UTIL HYD and MASTER CAUTION lights illuminate.
PRIM HYD FILTER	22625	Primary hydraulic filter is clogged.	Noncorrectable	<u>Instructor</u>: PRI HYD FILTER appears on CRT. <u>Trainee</u>: OIL BYP PRI HYD and MASTER CAUTION lights illuminate.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
UTIL HYD FILTER	22626	Utility hydraulic filter is clogged.	Noncorrectable	Instructor: UTIL HYD FILTER appears on CRT. Trainee: OIL BYP UTIL HYD and MASTER CAUTION lights illuminate.
UTIL ACCUM PRESS	22627	Utility accumulator pressure falls to zero.	Noncorrectable	Instructor: UTIL ACCUM PRESS appears on CRT. Trainee: UTIL ACC pressure gage falls to zero. APU does not start. Emergency hydraulic switch and associated functions do not operate. Rotor brake does not function and, if previously locked, unlocks.
LEFT BRAKE	22628	Hydraulic connection to left brake diverted.	Noncorrectable	Instructor: LEFT BRAKE appears on CRT. Trainee: Left toe brake does not increase friction on left wheel and is ineffective in bringing aircraft to a stop.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
RIGHT BRAKE	22629	Hydraulic connection to right brake diverted.	Noncorrectable	Instructor: RIGHT BRAKE appears on CRT. Trainee: Right toe brake does not increase friction on right wheel and is ineffective in bringing aircraft to a stop.
TAILWHEEL LOCK	22630	Tailwheel locked in direction of aircraft axis.	Noncorrectable	Instructor: TAILWHEEL LOCK appears on CRT. Trainee: Tailwheel remains locked regardless of tailwheel lock switch position. Tailwheel lock advisory light does not illuminate.
ASE AC	22701	Pilot center CB panel.	Noncorrectable	Instructor: ASE AC appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. All stability and command augmentation capabilities are lost.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
ASE DC	22702	Pilot center CB panel.	Noncorrectable	Instructor: ASE DC appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. All stability and command augmentation capabilities are lost.
ASE BUCS	22703	Pilot center CB panel.	Noncorrectable	Instructor: ASE BUCS appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. All backup control capabilities are lost.
VIB MON	22704	Pilot center CB panel.	Noncorrectable	Instructor: VIB MON appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system.
ENG INST	22705	Pilot center CB panel.	Noncorrectable	Instructor: ENG INST appears on CRT. Trainee: Circuit breaker pops. Every other light segments for all engine instruments illuminate. AUX PWR light above test switch also illuminates.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
FIRE DETR ENG 1	22706	Pilot center CB panel.	Noncorrectable	Instructor: FIRE DETR ENG 1 appears on CRT. Trainee: Circuit breaker pops. Loss of indication of fires for both crewmembers for engine 1.
FIRE DETR ENG 2	22707	Pilot center CB panel.	Noncorrectable	Instructor: FIRE DETR ENG 2 appears on CRT. Trainee: Circuit breaker pops. LOSS of indication of fires for both crewmembers for engine 2.
FIRE DETR APU	22708	Pilot center CB panel.	Noncorrectable	Instructor: FIRE DETR APU appears on CRT. Trainee: Circuit breaker pops. Loss of indication of APU fires in pilot station.
FIRE EXTGH PLT	22709	Pilot center CB panel.	Noncorrectable	Instructor: FIRE EXTGH PLT appears on CRT. Trainee: Circuit breaker pops. Loss of capability to extinguish fires for engine 1 or 2 through pilot station.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
FIRE EXTGH CPG	22710	Pilot center CB panel.	Noncorrectable	Instructor: FIRE EXTGH CPG appears on CRT. Trainee : Circuit breaker pops. Loss of capability to extinguish fires for engine 1 or 2 through CPG station.
FIRE EXTGH APU	22711	Pilot center CB panel.	Noncorrectable	Instructor : FIRE EXTGH APU appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. LOSS of capability to extinguish fires for APU.
FUEL VLV ACTR	22712	Pilot center CB panel.	Noncorrectable	Instructor : FUEL VLV ACTR appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system.
FUEL FILL	22713	Pilot center CB panel.	Noncorrectable	Instructor: FUEL FILL appears on CRT. Trainee: Circuit breaker pops.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
FUEL APU	22714	Pilot center CB panel.	Noncorrectable	Instructor: FUEL APU appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. If running. APU winds down and stops.
ENG WARN	22715	Pilot center CB panel.	Noncorrectable	Instructor: ENG WARN appears on CRT. Trainee: Loss of power to engine out warning system.
JETT	22716	Pilot center CB panel.	Noncorrectable	Instructor: JETT appears on CRT. Trainee: If both mission jettison and jettison CB's are tripped, weapons cannot be jettisoned.
LT ANTI COL	22717	Pilot center CB panel.	Noncorrectable	Instructor: LT ANTI COL appears on CRT. Trainee: Circuit breaker pops.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
LT PRI	22718	Pilot center CB panel.	Noncorrectable	Instructor: LT PRI appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Loss of lighting to various systems.
LT NAV	22719	Pilot center CB panel.	Noncorrectable	Instructor: LT NAV appears on CRT. Trainee: Circuit breaker pops.
LT FORM	22720	Pilot center CB panel.	Noncorrectable	Instructor: LT FORM appears on CRT. Trainee: Circuit breaker pops.
LT SRCH LDG	22721	Pilot center CB panel.	Noncorrectable	Instructor: LT SRCH LDG appears on CRT. Trainee: Circuit breaker pops. Loss of control and power to searchlight.
LT SRCH/LDG CNTR	22722	Pilot center CB panel.	Noncorrectable	Instructor: LT SRCH/LDG CNTR appears on CRT. Trainee: Circuit breaker pops. Loss of control and power to searchlight.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircaft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
LT CAUT	22723	Pilot center CB panel.	Noncorrectable	Instructor: LT CAUT appears on CRT. Trainee: Circuit breaker pops. Loss of power to pilot and master caution and warning panels.
LT UTIL SEC	22724	Pilot center CB panel.	Noncorrectable	Instructor: LT UTIL SEC appears on CRT. Trainee: Circuit breaker pops. Loss of power to PLT UTILITY LT.
EMERG HYD	22725	Pilot center CB panel.	Noncorrectable	Instructor: EMERG HYD appears on CRT. Trainee: Circuit breaker pops. Loss of power to EMERG HYD switch at both stations. Accumulator cannot be used to control movements.
TRIM	22726	Pilot center CB panel.	Noncorrectable	Instructor: TRIM appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. HSI HDG flag is in view.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to Instructor/operator and trainee
RDR ALT	22727	Pilot center CB panel.	Noncorrectable	Instructor: RDR ALT appears on CRT. Trainee: Circuit breaker pops. Loss of power to RDR ALT. Altitude pointer freezes behind mask, digital display blanks, and flag is in view.
STBY ATTD	22728	Pilot center CB panel.	Noncorrectable	Instructor: STBY ATTD appears on CRT. Trainee: Circuit breaker pops. Loss of power to STBY ADI. Pitch and roll slowly decrease (pitch down and roll to the right) as the gyro runs down. OFF flag is in view.
THROT	22729	Pilot center CB panel.	Noncorrectable	Instructor: THROT appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. CPG cannot activate pilot throttle release. Loss of solenoid operation in throttle quadrant.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
ENG CUT	22730	Pilot center CB panel.	Noncorrectable	Instructor: ENG CUT appears on CRT. Trainee: Circuit breaker pops. Loss of power to engine chop collar. Engines do not go to idle when chop is activated.
ENG LVR	22731	Pilot center CB panel.	Noncorrectable	Instructor: ENG LVR appears on CRT. Trainee: Engine LVR circuit breaker pops.
ENG START	22732	Pilot center CB panel.	Noncorrectable	Instructor: ENG START appears on CRT. Trainee: Circuit breaker pops. Loss of power to engine ignition system.
FUEL XFEED	22733	Pilot center CB panel.	Noncorrectable	Instructor: FUEL XFEED appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Fuel crossfeed switch is nonfunctional for crossfeed if full.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
FUEL TRANS	22734	Pilot center CB panel.	Noncorrectable	Instructor: FUEL TRANS appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Fuel transfer switch is nonfunctional for transfer of fuel.
FUEL BST	22735	Pilot center CB panel.	Noncorrectable	Instructor: FUEL BST appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Fuel boost switch is nonfunctional.
TWHL LOCK	22736	Pilot center CB panel.	Noncorrectable	Instructor: TWHL LOCK appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. No power to tailwheel lock panel and switch.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to Instructor/operator and trainee
COMM ADF	22737	Pilot center CB panel.	Noncorrectable	Instructor: COMM ADF appears on CRT. Trainee : Circuit breaker pops. Loss of power to ADF. ADF audio ceases. Bearing indication on RMI and HSI PTR #2 freeze at current value.
COMM IFF	22738	Pilot center CB panel.	Noncorrectable	Instructor: COMM IFF appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. All IFF functions cease.
COMM KY 58	22739	Pilot center CB panel.	Noncorrectable	Instructor: COMM KY 58 appears on CRT. Trainee : Circuit breaker pops.
COMM UHF AH	22740	Pilot center CB panel.	Noncorrectable	Instructor: COMM UHF AM appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. UHF AM radio inoperative. UHF switch lights extinguish.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft Indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
COMM KY 28	22741	Pilot center CB panel.	Noncorrectable	Instructor: COMM KY 28 appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. KY-28 tones cease, and status lights extinguish.
COMM VHF FM	22742	Pilot center CB panel.	Noncorrectable	Instructor: COMM VHF FM appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. PLT VHF AM/FM radio inoperative. Loss of comunications. PLT VHF switch lights extinguish.
COMM ICS	22743	Pilot center CB panel.	Noncorrectable	Instructor: COMM ICS appears on CRT. Trainee: Circuit breaker pops. Loss of power to PLT ICS. Pilot loses all comunications (UHF, VHF, ICS).
PITOT HTR	22744	Pilot center CB panel.	Noncorrectable	Instructor: PITOT HTR appears on CRT. Trainee: Circuit breaker pops. Loss of power to pitot static system.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
RDR WARN	22745	Pilot center CB panel.	Noncorrectable	Instructor: RDR WARN appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. After removal of malfunction, RWR system takes up to 30 seconds to become fully operational.
RTR BRK	22746	Pilot center CB panel.	Noncorrectable	Instructor: RTR BRK appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Rotor brake switch is nonfunctional.
APU HOLD	22747	Pilot center CB panel.	Noncorrectable	Instructor: APU HOLD ap pears on CRT. Trainee: Circuit breaker pops.
CHAFF	22748	Pilot center CB panel.	Noncorrectable	Instructor: CHAFF appears on CRT. Trainee: Circuit breaker pops. Loss of power to chaff system. No CHAFF arm light illumination when chaff system is armed.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
MISSION JETT	22801	Pilot forward CB panel.	Noncorrectable	Instructor: MISSION JETT appears on CRT. Trainee: Circuit breaker pops. Pilot cannot perform selection jettison of weapons. Pilot and CPG can still jettison all weapons if JETT CB is not popped.
MISSION EL DC	22802	Pilot forward CB panel.	Noncorrectable	Instructor: MISSION EL DC appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system.
MISSION EL AC	22803	Pilot forward CB panel.	Noncorrectable	Instructor: MISSION EL AC appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system.
MISSION PNVS DC	22804	Pilot forward CB panel.	Noncorrectable	Instructor: MISSION PNVS DC appears on CRT. Trainee: Circuit breaker pops. Loss of power to PNVS. No PNVS imagery available when PNVS is selected as video source for IHADSS, IVD displays, or VDU. Symbology remains.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft Indications and related effects	Corrective action	Indications presented to Instructor/operator and trainee
MISSION PNVS AC	22805	Pilot forward CB panel.	Noncorrectable	Instructor: MISSION PNVS AC appears on CRT. Trainee: Circuit breaker pops. Loss of power to PNVS. No PNVS imagery available when PNVS is selected as video source for IHADSS, IVD displays, or VDU. Symbology remains.
MISSION SYM GEN	22806	Pilot forward CB panel.	Noncorrectable	Instructor: MISSION SYM GEN appears on CRT. Trainee: Circuit breaker pops. Loss of power to symbol generator. All video and symbology coming from or going to symbol generator is lost. Crew must use auxiliary video inputs to ORT and IHADSS without symbology.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft Indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
NAV HARS AC	22807	Pilot forward CB panel.	Noncorrectable	Instructor: NAV HARS AC appears on CRT. Trainee : Circuit breaker pops. Loss of power to HARS. CPG ADI, RMI, and HSI compass rings, HSI PTR #2, and RMI PTR freeze at current conditions with ADI off flag, HSI HDG flag, and RMI off flag, in view. Doppler HAL light illuminates.
NAV HARS DC	22808	Pilot forward CB panel.	Cycle doppler OFF then back ON, HARS inflight alignment procedure continued.	Instructor: NAV HARS DC appears on CRT. Trainee : Circuit breaker pops. Loss of power to HARS. HARS MUX BUS outputs lost. CPG ADI pitches 45°& rolls 0° with off flag in view. RMI and PLT HSI attitude and heading indications freeze. With HSI HDG flag & RMI off flag in view, doppler HALF light illuminates.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
NAV DPLR	22809	Pilot forward CB panel.	Noncorrectable	Instructor: NAV DPLR appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. All displays and lamps on DPLR panel extinguish. HSI course deviation bar centers. NAV flag and range shutter are in view. HSI PRT #l parks at 90° index mark.
RKT ELEX	22810	Pilot forward CB panel.	Noncorrectable	Instructor: RKT ELEX appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Crew unable to select, arm, or fire rockets.
ARM CONTR	22811	Pilot forward CB panel	Noncorrectable	Instructor: ARM CONTR appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Crew unable to arm or fire weapon.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
PEN AIDS CONTR	22812	Pilot forward CB panel.	Noncorrectable	Instructor: PEN AIDS CONTR appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. IR jammer inoperable with no visible indication. Radar jammer self-test lamps do not illuminate during self-test.
RDR HAN DC	22813	Pilot forward CB panel.	Noncorrectable	Instructor: RDR JAM DC appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Radar jammer inoperable. RDR JAM caution light illuminates if jammer is in STBY or OPR.
IHADSS	22814	Pilot forward CB panel.	Noncorrectable	Instructor: IHADSS appears on CRT. Trainee: Circuit breaker pops. Loss of power to IHADSS. No IHADSS LOS information or imagery available at either cockpit.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
HSI	22815	Pilot forward CB panel.	Noncorrectable	Instructor: HSI appears on CRT. Trainee: Circuit breaker pops. Loss of power to HSI. All HSI flags and shutter in view. PTR's and compass card freeze at current indications.
VDU	22816	Pilot forward CB panel.	Noncorrectable	Instructor: VDU appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system.
FC AC	22817	Pilot forward CB panel.	Noncorrectable	Instructor: FC AC appears on CRT. Trainee: Circuit breaker pops. Loss of ac power to fire control panels. Crew cannot select, arm, or fire weapons.
FC DC	22818	Pilot forward CB panel.	Noncorrectable	Instructor: FC DC appears on CRT. Trainee: Circuit breaker pops. Loss of dc power to fire control panels. Crew cannot select, arm, or fire weapons.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
IR JAM PWR	22819	Pilot forward CB panel.	Noncorrectable	Instructor: IR JAM PWR appears on CRT. Trainee : Circuit breaker pops. Loss of power to indicated system. IR JAM caution light illuminates during jammer cooldown, if jammer was on (up to 60 sec.); then extinguishes.
IR JAM XMTR	22820	Pilot forward CB panel.	Noncorrectable	Instructor: IR JAM CMTR appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. IR JAM caution light illuminates if IR jammer is on.
RDR JAM AC	22821	Pilot forward CB panel.	Noncorrectable	Instructor: RDR JAM AC appears on CRT. Trainee: Circuit breaker pops. Loss of ac power to indicated system. IR JAM caution light illuminates if IR jammer is on.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
AIR DATA AC	22822	Pilot forward CB panel.	Noncorrectable	Instructor: AIR DATA AC appears on CRT. Trainee: Circuit breaker pops. Loss of ac power to indicated system. Air data processor is inoperative.
AIR DATA DC	22823	Pilot forward CB panel.	Noncorrectable	Instructor: AIR DATA DC appears on CRT. Trainee: Circuit breaker pops. Loss of ac power to indicated system. Air data processor is inoperative.
ECS FAB FANS	22901	Pilot aft CB panel.	Noncorrectable	Instructor: ECS FAB FANS appears on CRT. Trainee: Circuit breaker pops. Sound of ECS FAB fans stop.
ECS CAB	22902	Pilot aft CB panel.	Noncorrectable	Instructor: ECS CAB appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Loss of ECS standby fans.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
ECS AFT FAN	22903	Pilot aft CB panel.	Noncorrectable	Instructor: ECS AFT FAN appears on CRT. Trainee : Circuit breaker pops. Sound of aft avionics fan stops.
STAB AUTO AC	22904	Pilot aft CB panel.	Noncorrectable	Instructor: STAB AUTO AC appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Automatic stabilator positioning capabilities are lost.
STAB AUTO DC	22905	Pilot aft CB panel	Noncorrectable	Instructor: STAB AUTO DC appears on CRT. Trainee : Circuit breaker pops. Loss of power to indicated system. Automatic stabilator positioning capabilities are lost.
STAB MAN DC	22906	Pilot aft CB panel.	Noncorrectable	Instructor : STAB HAN DC appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Stabilator positioning capabilities are lost.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
STAB MAN AC	22907	Pilot aft CB panel.	Noncorrectable	Instructor: STAB MAN AC appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Stabilator positioning capabilities are lost.
WSHLD WPR	22908	Pilot aft CB panel.	Noncorrectable	Instructor: WSHLD WPR appears on CRT. Trainee: Circuit breaker pops.
ICE DET	22909	Pilot aft CB panel.	Noncorrectable	Instructor: ICE DET appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Automatic rotor blade deice function inoperable.
BLADE DEICE CONT	22910	Pilot aft CB panel.	Noncorrectable	Instructor: BLADE DEICE CONT appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system. Blade deicing capability is lost.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
BLADE DEICE	22911	Pilot aft CB panel.	Noncorrectable	Instructor: BLADE DEICE appears on CRT. Trainee: Circuit breaker pops. Loss of power to indicated system.
CNPY ANTIICE CNT	22912	Pilot aft CB panel.	Noncorrectable	Instructor: CNPY ANTI ICE CNT appears on CRT. Trainee: Circuit breaker pops.
NOSE GRBX HT	22913	Pilot aft CB panel.	Noncorrectable	Instructor: NOSE GRBX HT appears on CRT. Trainee: Circuit breaker pops. Loss of engine inlet device capability.
ENG ANTI ICE	22914	Pilot aft CB panel	Noncorrectable	Instructor: ENG ANTIICE appears on CRT. Trainee: Circuit breaker pops. Engines go into de-icing.
CANOPY ANTI ICE	22915	Pilot aft CB panel	Noncorrectable	Instructor: CANOPY ANTI ICE appears on CRT. Trainee: Circuit breaker pops.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
PWR XFMR RECT 1	22916	Pilot aft CB panel.	Noncorrectable	Instructor: PWR XFMR RECT 1 appears on CRT. Trainee: Circuit breaker pops. Loss of transformer rectifier 1.
POWER ENG 1	22917	Pilot aft CB panel.	Noncorrectable	Instructor: POWER ENG 1 appears on CRT. Trainee: Circuit breaker pops. Loss of power to engine 1 ECU.
POWER ENG 2	22918	Pilot aft CB panel.	Noncorrectable	Instructor: POWER ENG 2 appears on CRT. Trainee: Circuit breaker pops. Loss of power to engine 2 ECU.
PWR XFER RECT 2	22919	Pilot aft CB panel.	Noncorrectable	Instructor: PWR XFER RECT 2 appears on CRT. Trainee: Circuit breaker pops. Loss of transformer rectifier 2.
PWR BATT CHGR AC	22920	Pilot aft CB panel.	Noncorrectable	Instructor: PWR BATT CHGR AC appears on CRT. Trainee: Circuit breaker pops. HOT BATT light illu- minutes.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
PWR BATT CHGR DC	22921	Pilot aft CB panel.	Noncorrectable	Instructor: PWR BATT CHGR DC appears on CRT. Trainee: Circuit breaker pops. Battery power available to dc emergency bus for 12 minutes before battery power is lost.
PRI LT	23001	CPG main CB panel.	Noncorrectable	Instructor: PRI LT appears on CRT. Trainee: Circuit breaker pops. Loss of panel lighting.
CAUT	23002	CPG main CB panel.	Noncorrectable	Instructor: CAUT appears on CRT. Trainee: Circuit breaker pops. Loss of power to CPG CW/A and MASTER CAUTION panel.
UTIL SEC LT	23003	CPG main CB pane 1.	Noncorrectable	Instructor: UTIL SEC LT appears on CRT. Trainee: Circuit breaker pops. Loss of power to CPG utility light.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
ENG INST	23004	CPG main CB pane 1.	Noncorrectable	Instructor: ENG INST appears on CRT. Trainee : Circuit breaker pops. Every other light segment for all engine instruments illuminates in both crew stations. AUX PWR light above test switch on pilot instrument test panel illuminates.
VHF AM FM	23005	CFG main CB panel.	Noncorrectable	Instructor: VHF AM FM appears on CRT. Trainee : Circuit breaker pops. Loss of power to CPG VHF radio. Loss of VHF AM/FM communications. CPG VHF switch lights extinguish.
ICS	23006	CPG main CB panel.	Noncorrectable	Instructor: ICS appears on CRT. Trainee : Circuit breaker pops. Loss of power to CPG ICS; all CPG COMM lost.
MSL ARM	23007	CPG main CB panel.	Noncorrectable	Instructor : MSL ARM appears on CRT. Trainee : Circuit breaker pops. Loss of power to indicated system. Crew unable to arm or fire missiles.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
MSL L OUTBD DC	23008	CPG main CB panel.	Noncorrectable	Instructor: MSL L OUTB DC appears on CRT. Trainee: Circuit breaker pops. Loss of dc power to indicated system. Crew unable to arm or fire left-hand outboard missiles.
MSL R OUTBD AC	23009	CPG main CB panel.	Noncorrectable	Instructor: MSL R OUTB AC appears on CRT. Trainee: Circuit breaker pops. Loss of ac power to indicated system. Crew unable to arm or fire right-hand outboard missiles.
MSL L INBD DC	23010	CPG main CB panel.	Noncorrectable	Instructor: MSL L INB DC appears on CRT. Trainee: Circuit breaker pops. Loss of dc power to indicated system. Crew unable to arm or fire left-hand inboard missiles.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
MSL R INBD AC	23011	CPG main CB panel.	Noncorrectable	Instructor: MSL R INB AC appears on CRT. Trainee: Circuit breaker pops. Loss of ac power to indicated system. Crew unable to arm or fire right-hand inboard missiles.
MSL DC ELEC	23012	CPG main CB panel	Noncorrectable	Instructor: MSL DC ELEC appears on CRT. Trainee : Circuit breaker pops. Loss of dc power to missiles electronics. Unable to select, arm. or launch missiles.
MSL R OUTBD DC	23013	CPG main CB panel.	Noncorrectable	Instructor: MSL R OUTBD DC appears on CRT. Trainee: Circuit breaker pops. Loss of dc power to right outboard missile. Crew unable to arm or fire right-hand outboard missiles.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
MSL L INBD AC	23014	CPG main CB panel.	Noncorrectable	Instructor: MSL L INBD AC appears on CRT. Trainee: Circuit breaker pops. Loss of ac power to left inboard launcher. Unable to fire left-hand inboard missiles.
MSL R INBD DC	23015	CPG main CB panel.	Noncorrectable	Instructor: MSL R INBD DC appears on CRT. Trainee: Circuit breaker pops. Loss of dc power to right inboard launcher. Unable to fire right-hand inboard missiles.
MSL L OUTBD AC	23016	CPG main CB panel.	Noncorrectable	Instructor: MSL L OUTBD AC appears on CRT. Trainee: Circuit breaker pops. Loss of ac power to left outboard launcher. Unable to fire left-hand outboard missiles.
FC FCC AC	23017	CPG main CB panel.	Noncorrectable	Instructor: FC FCC AC appears on CRT. Trainee: Circuit breaker pops. Loss of ac power to FCC. No FCC functions available.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
FC FCC DC	23018	CPG main CB panel.	Noncorrectable	Instructor: FC FCC DC appears cm CRT. Trainee: Circuit breaker pops. Loss of dc power to FCC. FCC switches to second-dary. If MIX switch is in primary position, PRI MUX caution light illuminates.
FC RCDR	23019	CPG main CB panel.	Noncorrectable	Instructor: FC RCDR appears on CRT. Trainee: Circuit breaker pops. Loss of power to recorder panel.
ATTD IND	23020	CPG main CB panel.	Noncorrectable	Instructor: ATTD appears on CRT. Trainee: Circuit breaker pops. Loss of power to CPG. ADI, and RMI systems. All indications on both instru-ments freeze at current con-ditions, with flags in view.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
AWS AMMO	23021	CPG main CB panel.	Noncorrectable	Instructor: AWS AMMO appears on CRT. Trainee: circuit breaker pops. Loss of Power to gun ammo electronics. Unable to fire gun.
AWS MTR	23022	CPG main CB Panel.	Noncorrectable	Instructor: AWS MTR appears on CRT. Trainee: Circuit breaker pops. Loss of Power to AWS MTR. Unable to fire or aim gun.
AWS AC	23023	CPG main CB panel.	Noncorrectable	Instructor: AWS AC appears on CRT. Trainee: Circuit breaker pops. Loss of ac power to gun. Unable to use gun.
AWS DC	23024	CPG main CB panel.	Noncorrectable	Instructor: AWS DC appears on CRT. Trainee: Circuit breaker pops. LOSS of dc power to gun. Unable to use gun.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
MUX L PYL OUTBD	23025	CPG main CB panel.	Noncorrectable	Instructor: MUX L PYL OUTBD appears on CRT. Trainee: Circuit breaker pops. Loss of MUX communication with left outboard pylon. Cannot fire from left outboard pylon.
MUX L PYL INBD	23026	CPG main CB panel.	Noncorrectable	Instructor: MUX L PYL INBD appears on CRT. Trainee: Circuit breaker pops. Loss of MUX communication with left inboard pylon. Cannot fire from left inboard pylon.
MUX R PYL OUTBD	23027	CPG main CB panel.	Noncorrectable	Instructor: MUX R PYL OUTBD appears on CRT. Trainee: Circuit breaker pops. Loss of MUX communication with right outboard pylon. Cannot fire from right outboard pylon.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
MUX R PYL INBD	23028	CPG main CB panel.	Noncorrectable	Instructor: MUX R PYL INBD appears on CRT. Trainee: Circuit breaker pops. Loss of MUX communication with right inboard pylon. Cannot fire from right inboard pylon.
MUX FAB L	23029	CPG main CB panel.	Noncorrectable	Instructor: MUX FAB L appears on CRT. Trainee: Circuit breaker pops. Loss of MUX communications left.
MUX FAB R	23030	CPG main CB panel.	Noncorrectable	Instructor: MUX FAB R appears on CRT. Trainee: Circuit breaker pops. Loss of MUX communications right.
MUX CPG	23031	CPG main CB panel.	Noncorrectable	Instructor: MUX CPG appears on CRT. Trainee: Circuit breaker pops. Loss of MUX communications in CPG station.

Table 7-16. Malfunction Details -- Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective act ion	Indications presented to instructor/operator and trainee
IHADSS	23032	CPG auxiliary CB panel.	Noncorrectable	Instructor: IHADSS appears on CRT. Trainee: Circuit breaker pops. Loss of power to IHADSS. No IHADSS LOS information for FCC or imagery for pilot or CPG.
TADS DC	23033	CPG auxiliary CB panel.	Noncorrectable	Instructor: TADS DC appears on CRT. Trainee : Circuit breaker pops. Loss of dc power to TADS. DVO still available. No TADS or LRF/D/T capabilities.
TADS AC	23034	CPG auxiliary CB panel.	Noncorrectable	Instructor: TADS AC appears on CRT. Trainee: Circuit breaker pops. Loss of ac power to TADS. DVO still available. No TADS or LRP/D/T capabilities.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
LASER	23035	CPG auxiliary CB panel.	Noncorrectable	Instructor: LASER appears on CRT. Trainee: Circuit breaker pops. Loss of power to laser. No laser range finding, designation, or tracking capabilities.
PITOT TUBE HOIST	23101	Moisture in pitot system.	Set PITOT HEAT switch on. After a 2-minute delay, system operates normally.	Instructor: PITOT TUBE MOIST appears on CRT. Trainee: Both pilot and CPG altimeters, IVSI's. and airspeed indicators show static erroneous readings of 10 (± 2) knots prior to engine start.
TURN INDICATOR	23102	Turn indicator always centered.	Noncorrectable	Instructor: TURN INDICATOR appears on CRT. Trainee: Turn indicator always centered.
MAGNETIC COMPASS	23103	Magnetic compass indicator fails.	Noncorrectable	Instructor: MAGNETIC COMPASS appears on CRT. Trainee: Indicator freezes at current heading.

Table 7-16. Malfunction Details - continued

Required malfunction	Ref number	Aircraft Indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
RADAR ALTIMETER	23104	Radar altimeter cannot lock onto a valid signal.	Noncorrectable	Instructor: RADAR ALTIMETER appears on CRT. Trainee : Radar altimeter needle is driven behind the mask, digital display is blanked, and off flag is in view.
PILOT ATT IND	23105	Pilot standby attitude Indicator falls.	Noncorrectable	Instructor: PILOT ATT IND appears on CRT. Trainee: AD1 fails to respond to changes In aircraft movement. OFF flag in view. Pitch and roll indications freeze at current indications. Pulling cage knob forces indicator to read 0 degrees pitch & 0 degrees roll.
STABILATOR IND	23106	Stabilator indicator frozen.	Noncorrectable	Instructor: STABILATOR IND appears on CRT. Trainee : Both stabilator indicators freeze at current setting at time of malfunction insertion. Stabilator operates normally in automatic and manual modes.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
ADSS	23107	Air data sensor subsystem stops providing data to FCC.	Noncorrectable	Instructor: ADSS FAIL appears on CRT. Trainee: outputs to FCC stop. MASTER CAUTION light illuminates. ADS light illuminates at both stations.
VHF XCVR-PLT	23120	Pilot VHF FM/AM transceiver unable to transmit or receive signals.	Noncorrectable	Instructor: VHF XCVR-PLT appears on CRT. Trainee: No PLT VHF reception. transmission. or sidetone.
VHF XCVR-CPG	23121	CPG VHF transceiver unable to transmit or receive signals.	Noncorrectable	Instructor: VHF XCVR-CPG appears on CRT. Trainee : No CPG VHF reception. transmission, or sidetone.
UHF XCVR	23122	UHF transceiver unable to transmit or receive signals.	Noncorrectable	Instructor: UHF XCVR appears on CRT. Trainee : No UHF reception. transmission, or sidetone.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft Indications and related effects	Corrective action	Indications presented to Instructor/operator and trainee
PLT INTERCOM	23123	C-11746 COMM panel In pilot cockpit is inoperative.	Noncorrectable	Instructor: PLT INTERCOM appears on CRT. Trainee: Pilot cannot transmit or receive on ICS or any radio.
CPG INTERCOM	23124	C-11746 COMM panel In CPG cockpit is Inoperative.	Noncorrectable	Instructor: CPG INTERCOM appears on CRT. Trainee: CPG cannot transmit or receive on ICS or any other radio.
IFF	23125	IFF KIT computer fails.	Noncorrectable	Instructor: IFF FAIL appears on CRT. Trainee : KIT status light on IFF panel illuminates. IFF caution lights illuminate In both cockpits. IFF NO-GO light illuminates when MODE 4 TEST is selected.
ADF RCVR	23140	No ADF signal reception available.	Noncorrectable	Instructor: ADF RCVR appears on CRT. Trainee : All ADF audio is lost. HSI PTR #2 and RMI PTR freeze at current condit Ions.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
ADF BEARING ERROR	23141	ADF radio cannot lock onto signals from radio facilities.	Noncorrectable	Instructor: ADF BEARING ERROR appears on CRT. Trainee : HSI and RMI bearing pointers oscillate ±20° from station bearing at a rate of 6 deg/sec.
DOPPLER RTA	23142	Receiver-transmitter antenna falls. Doppler beam Information is lost.	Noncorrectable: backup mode is available.	Instructor: DOPPLER RTA appears on CRT. Trainee: HSI range and NAV flags drop Into view. Bearing pointer 1 parks at 90° and course deviation bar centers. CDU MEM light illuminates. 1553 bus outputs disabled. After system test: MAL light illuminates DNS display reads: 147 130 000 315 then, display reads: MN R-00000

Table 7-16. Malfunction Details - continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to Instructor/operator and trainee
DOPPLER SDC PWR	23143	The power supply in the signal data converter fails. All signals routed to DNS through the SDC are lost.	Noncorrectable; turn DNS off.	Instructor: DOPPLER SDC PWR appears on CRT. Trainee: HSI range and NAV flags drop into view. Bearing pointer 1 parks at 90° and HSI course deviation bar centers. CDU MEM and MAL lights illuminate. DNS outputs and displays are erroneous. 1553 bus outputs are in error. After running system test: The display reads: 000 000 000 000 then display reads: NG S890000
HARS HEADING	23144	Valid HARS heading data is lost.	Noncorrectable	Instructor: HARS HEADING appears on CRT. Trainee: Compass rings on HSI and RMI freeze at their current indications, compass ring flags In view.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft Indications and related effects	Corrective action	Indications presented to Instructor/operator and trainee
HARS	23145	HARS built-in-test detects failure in gyro package.	When malfunction is deleted. the HARS is fully operational - no delay.	Instructor: HARS appears on CRT. Trainee : PLT HSI and CPG RMI HDG, and AD1 flags fall Into view. HSI and RMI compass rings freeze. CPG AD1 and PLT VDU pitch and roll freeze. DASE switches drop out. ASE caution light illuminates. HARS mux bus outputs reflect the above conditions.
HSI COMPASS CARD	23146	HSI compass card freezes at current condition.	Noncorrectable	Instructor: HSI COMPASS CARD appears on CRT. Trainee : HSI compass card does not move with changes In A/C heading. Flag not In view.
HSI COURSE	23147	HSI course deviation bar fails.	Noncorrectable	Instructor: HSI COURSE BAR appears on CRT. Trainee : HSI course deviation bar is centered. NAV warning flag is not in view.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft Indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
ADF TO HSI	23148	HSI bearing pointer 2 freezes.	Use bearing indication on HSI pointer 1 or RMI	Instructor: ADF TO HSI appears on CRT. Trainee : HSI PTR #2 does not reflect ACFT movements relative to a tuned ADF station.
LDNS TO HSI	23149	Connector on HSI for LDNS data breaks.	Noncorrectable	Instructor: LDNS TO HSI appears on CRT. Trainee : HSI range and NAV flags drop into view. Course bar centers. PTR #l parks at 90° index mark. LDNS mux bus interface not affected.
RMI PTR FRZ	23150	RMI bearing pointer freezes.	Noncorrectable	Instructor: RMI PTR FRZ appears on CRT. Trainee : RMI bearing pointer does not reflect A/C movements relative to a tuned ADF.
AD1 CPG	23151	Attitude Indicator in CPG cockpit fails.	Noncorrectable	Instructor: AD1 CPG appears on CRT. Trainee : Pitch and roll indications on CPG ADI freeze at current conditions. OFF flag in view.

Table 7-16. Malfunction Details - continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
TADS	23201	TEU failure-processor fault.	Noncorrectable	Instructor: TADS appears on CRT. Trainee: TEU does not respond to FCC. Turret locks in position. No laser tracker or rangefinder/designator available. TADS light illuminates. TADS FAIL message appears on AND if TADS is selected sight.
RANGERFINDER	23202	Failure of laser rangefinder.	Noncorrectable	Instructor: RANGERFINDER appears on CRT. Trainee: No laser range available for FCC. FD/LS flashes in sensor. ID field of TADS display. RFD-D goes blank in LRF/D and LST code status section of AND.
DESIGNATOR	23203	Failure of laser.	Noncorrectable	Instructor: DESIGNATOR appears on CRT. Trainee: Crew unable to autonomously designate targets for HELLFIRE missiles. FD/LS flashes in sensor ID field of TADS display. RFD-D goes blank in LRF/D and LST code status section of AND.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
LASER HOT	23204	Laser overtemp failure in LRF/D.	Noncorrectable	Instructor: LASER HOT appears on CRT. Trainee: TADS laser transceiver unit (LTU) fails. LRF-D overtemp message appears in high-action display.
DTV	23205	Loss of TADS TV imagery.	Noncorrectable	Instructor: DTV appears on CRT. Trainee: No imagery when TADS TV is selected as video source for IDV, IHADSS. or VDU. TV FAIL displayed in sight status section of AND. FD/LS flashes in sensor ID field of TADS displays.
TADS-FLIR	23206	Loss of TADS-FLIR imagery.	Noncorrectable	Instructor: TADS-FLIR appears on CRT. Trainee: No imagery when TADS FLIR is selected as video source for IDV. IHADSS. or VDU. FD/LS flashes in sensor ID field of TADS displays. FLIR FAIL is displayed in sight status of AND.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
TADS-FLIR COOLER	23207	Failure of Cooling to IR detectors.	Noncorrectable	Instructor: TADS-FLIR COOLER appears on CRT. Trainee: TADS FLIR imagery gain decreases. Noise increases. FLIR NOT COOLED is displayed.
LASER SPOT TRKR	23208	Failure of laser tracker.	Noncorrectable	Instructor: LASER SPOT TRKR appears on CRT. Trainee: CPG unable to lock on and track remotely designated target. FD/LS flashes in sensor ID field of TADS displays. LST-C goes blank in LRF-D and LST code status sections of AND. LST FAILED is displayed in TRACKER STATUS section of AND.
IAT NO LOCK-ON	23209	CRG unable to lock on targets in TADS imagery.	Noncorrectable	Instructor: IAT NO LOCK-ON appears on CRT. Trainee: IAT symbology available but CPG unable to obtain image lock (IAT) on targets in TADS.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
IMAGE AUTO TRKR	23210	Failure of TADS image auto tracker.	Noncorrectable	Instructor: IMAGE AUTO TRKR appears on CRT. Trainee: Loss of capability to lock on and track objects in TADS FLIR and TV imagery. FD/LS flashes in sensor ID fields of TADS displays. IAT FAILED is displayed in TRACKER STATUS section of AND.
LMC	23211	LMC switch failure on TADS ORT.	Noncorrectable	Instructor: LMC FAIL appears on CRT. Trainee: LMC mode not selectable. Manual updates of line-of-sight must be made.
PNVS	23220	PEU total failure.	Noncorrectable	Instructor: PNVS appears on CRT. Trainee: PNVS turret locks in posit ion. PNVS video fails. PNVS caution light illuminates and PNVS NO-GO appears on FD/LS.

Table 7-16. Malfunction Details - continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
PNVS LOCKED	23221	PNVS turret motion locks in current azimuth and elevation.	Noncorrectable	Instructor: PNVS LOCKED appears on CRT. Trainee : Crew unable to slew PRVS line-of-sight in azimuth or elevation.
PNVS VIDEO	23222	Loss of PNVS video.	Noncorrectable	Instructor : PNVS VIDEO appears on CRT. Trainee: No PNVS video when PNVS is selected as video source for IHADSS. IVD. or VDU. Flight symbology remains.
PNVS AZ DRIVE MTR	23223	PNVS azimuth drive motor failure.	Noncorrectable	Instructor: PNVS AZ DRIVE MTR appears on CRT. Trainee: Crew unable to slew PNVS line-of-sight in azimuth. Turret AZ locks in current position.
PNVS COOLER	23224	Failure of Cooling to IR detectors.	Noncorrectable	Instructor: PNVS COOLER appears on CRT. Trainee: PNVS imagery gain decreases and noise increases over a period of 70 seconds. PNVS NOT COOLED displayed on VDU.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
SEU	23225	Loss of line-of-sight information to pilot and CPG.	Malfunction deleted automatically after break-lock occurs.	Instructor: SEU FAIL appears on CRT. Trainee: No IHADSS LOS information available for FCC. FD/LS flashes in ID field of TADS displays. If FD/LS is selected, IHADSS NO-GO is displayed. IHADSS FAILED is displayed in sight status section of HAD symbology of IDV displays and VDU. If IHADSS is selected sight, IHADFAIL is displayed in weapon status section of high-action displays.
PLT DAP	23226	Loss of PNVS imagery (video and symbology).	Noncorrectable	Instructor: PLT DAP appears on CRT. Trainee: No imagery or synbology when PNVS is selected as video source for pilot IHADSS.

Table 7-16. Malfunction Details - continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
CPG DAP	23227	Loss of PNVS imagery.	Noncorrectable	<u>Instructor</u>: CPG DAP appears on CRT. <u>Trainee</u>: No imagery or symbology when PNVS is selected as video source for CPG IHADSS.
SYMBOL GENERATOR	23240	Total failure of symbol generator.	Noncorrectable	<u>Instructor</u>: SYMBOL GENERATOR appears on CRT. <u>Trainee</u>: Loss of all video and symbology that comes from or goes through symbol generator. Crew must use auxiliary video inputs to ORT and IHADSS without symbology.
FCC	23260	Failure of fire control computer.	Noncorrectable	<u>Instructor</u>: FCC appears on CRT. <u>Trainee</u>: If MUX switch on CPG FCP is in PRI when malfunction is selected. FCC stops and PRI MUX light illuminates. If MUX switch is in SEC, no indication occurs.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
VDU	23280	Power fail in VDU.	Noncorrectable	Instructor: VDU appears on CRT. Trainee : No video available on pilot VDU.
HELLFIRE SYSTEM	23301	RHE hardware failure (watchdog timer).	Noncorrectable	Instructor: HELLFIRE SYSTEM appears on CRT. Trainee: RHE reports failure to FCC. MISSILE caution light illuminates. Missile NO-Go displayed by FD/LS. No Hellfire capabilities exist.
MISSILE HANGFIRE	23302	Hangfire for next missile fires.	Malfunction deleted automatically after hangfire.	Instructor: MISSILE HANGFIRE appears on CRT. Trainee: Next missile fails to fire. Missile failure light illuminates. FD/LS flashes in sensor ID section of TADS displays. HANGFIRE is displayed in weapons status sections of high-action displays and on AND display.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
MISSILE MISFIRE	23303	Next missile fails to fire.	Malfunction deleted automatically after missile fails to fire.	Instructor: MISSILE MISFIRE appears on CRT. Trainee: Next missile fails to fire. Missile failure light illuminates in both cockpits. FD/LS flashes in sensor ID section of TADS displays.
MSL UNLATCHED	23304	Unlatched signal to RHE for affected MSL.	Noncorrectable	Instructor: MSL UNLATCHED appears on CRT. Trainee: FCC displays missile unlatched condition. MU displayed in proper missile position of AND. Malfunction clears to IS after a missile is unlatched.
MSL BIT	23305	Next missile fails to uncage and spin up.	Noncorrectable	Instructor: MSL BIT appears on CRT. Trainee: RHE reports MSL failed to spin up for display. Missile NO-GO is displayed by FD/LS. MF displayed in proper missile position of AND.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
L OUTBD LNCHR	23306	All analog replies from affected launcher are set to zero.	Noncorrectable	Instructor: L OUTBD LNCHR appears on CRT. Trainee: The word FAIL appears vertically in missile inventory and status section of the AND for left outboard launcher. FD/LS also indicates failure until removed by IS.
L INBD LNCHR	23307	All analog replies from affected launcher are set to zero.	Noncorrectable	Instructor: L INBD LNCHR appears on CRT. Trainee: The word FAIL appears vertically in missile inventory and status section of the AND for left inboard launcher. FD/LS also indicates failure until removed by IS.
R OUTBD LNCHR	23308	All analog replies from affected launcher are set to zero.	Noncorrectable	Instructor: R OUTBD LNCHR appears on CRT. Trainee: The word FAIL appears vertically in missile inventory and status section of the AND for right outboard launcher.

Table 7-16. Malfunction Details Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
R INBD LNCHR	23309	All analog replies from affected launcher are set to zero.	Noncorrectable	Instructor: R INBD LNCHR appears on CRT. Trainee: The word FAIL appears vertically in missile inventory and status section of the AND for right inboard launcher.
GUN TURRET JAM	23310	Gun turret jammed.	Noncorrectable	Instructor: GUN TURRET JAM appears on CRT. Trainee: Crew unable to fire gun. Turret jams at position gun is in when malfunction is inserted.
GUN NO FIRE	23311	Failure in 30-mm gun system.	Noncorrectable	INSTRUCTOR: GUN NO FIRE appears on CRT. Trainee: Crew unable to fire gun. GUN FAILURE illuminates on pilot and CPG caution panels. FD/LS flashes in sensor ID field of TADS displays. GUN FAIL displayed in weapons section of HAD and AND, on IDV display, and VDU.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
ARCS	23312	Failure in rocket subsystem	Noncorrectable	Instructor: ARCS appears on CRT. Trainee : Crew unable to fire rockets. Rocket control panel goes blank. ROCKET light illuminates. FD/LS flashes in sensor ID field of TADS displays. RKT FAIL displayed in weapon status section of HAD, IDV displays, VDU, and AND.
ROCKET HANGFIRE	23313	Next rocket fired burns IN tube.	Malfunction deleted automatically after hangfire.	Instructor: ROCKET HANGFIRE appears on CRT. Trainee: Next rocket fails to launch. HAMFIRE causes yaw movement to helicopter.
ROCKETS MISFIRE	23314	Next rocket fails to fire.	Malfunction deleted automatically after rocket fails to fire.	Instructor: ROCKET MISFIRE appears on CRT. Trainee: Next rocket fails to fire.
IR JAMMER	23320	Failure of IR jammer system.	Noncorrectable	Instructor: IR JAMMER appears on CRT. Trainee: IR missile cannot be jammed. IR JAM caution light illuminates.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
RADAR JAMMER	23321	Failure of radar jammer system.	Noncorrectable	Instructor: RADAR JAMMER appears on CRT. Trainee : Crew unable to cause threats to break radar lock so track mode continues, followed by missile launch unless crew remasks. If radar jammer is on, RDR JAM caution light illuminates. If malfunction is removed while radar jammer is on, RDR JAM caution light remains illuminated for approximately 3 minutes while jammer warms up.
CHAFF DISPENSER	23322	Failure of CHAFF dispenser system.	Noncorrectable	Instructor: CHAFF DISPENSER appears on CRT. Trainee: Pilot unable to eject chaff. CHAFF counter indicator does not cycle. ARM light on CHAFF dispenser does not illuminate.
RDR WARN RCVR	23323	Failure of left forward RWR antenna.	Noncorrectable	Instructor: RDR WARN RCVR appears on CRT. Trainee: Incorrect bearing and strobe length displayed for threats between 225° and 45°.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
AUTO BUCS COLL	*	Lift-axis flight control linkage is severed. Lift-axis BUCS is engaqed.	Noncorrectable	Instructor: AUTO BUCS COLL appears on CRT. Trainee: BUCS ON and MASTER CAUTION lights illuminate. In integrated mode, control of aircraft is assigned to designated flyer (pilot or CPG). In independent mode, pilot controls PLT cockpit. and CPG controls CPG cockpit.
AUTO BUC CYC-LON	*	Longitudinal-axis flight control linkage is severed. Longitudinal axis BUCS is engaged.	Noncorrectable	Instructor: AUTO BUC CYC LON appears on CRT. Trainee: BUCS ON and MASTER CAUTION lights illuminate, SAS damping not available (ASK switches engaged), CAS not available, and force trim operational. In integrated mode, control of aircraft is assigned to designated flyer (pilot or CPG). In independent mode, pilot controls PLT cockpit, and CPG controls CPG cockpit.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
AUTO BUCS PDLS	*	Yaw-axis flight control linkage is severed. Yaw-axis BUCS is engaged.	Noncorrectable	Instructor: AUTO BUCS PDLS appears on CRT. Trainee: BUCS ON and MASTER CAUTION lights illuminate. SAS damping not available (ASE switches engaged). CAS not available, and force trim operational. In integrated mode. control of aircraft is assigned to designated flyer (pilot or CPG). In independent mode. pilot controls PLT cockpit, and CPG controls CPG cockpit.
AUTO BUCS CYC- LAT	*	Lateral-axis flight control linkage is severed. BUCS is engaged.	Noncorrectable	Instructor: AUTO BUCS CYC LAT appears on CRT. Trainee: BUCS ON and MASTER CAUTION lights illuminate, SAS damping not available (ASE switches engaged). CAS not available, and force trim operational. In integrated mode, control of aircraft is assigned to designated flyer (pilot CPG). In independent mode, pilot controls PLT cockpit, and CPG controls CPG cockpit.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	corrective action	Indications presented to instructor/operator and trainee
MNL BUCS COLL	*	Lift-axis flight control jams.	Noncorrectable	Instructor: MNL BUCS COLL appears on CRT. Trainee: BUCS ON and MASTER CAUTION lights illuminate. In integrated mode, designated crewmember must break simulated shear pin. Control of other crewmember remains jammed. In independent mode, each crewmember must break simulated shear pin to remove jam and engage BUCS.
MNL BUCS CYC LON	*	Longitudinal-axis flight control jams.	Noncorrectable	Instructor: MNL BUCS CYC LON appears on CRT. Trainee: BUCS ON and MASTER CAUTION lights illuminate. SAS damping and CAS not available. In integrated mode, designated crewmember must break simulated shear pin. Control of other crewmember remains jammed. In independent mode, each crewmember must break simulated shear pin to remove jam and engage BUCS. If CPG engages BUCS. force trim is lost.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
MNL BUCS PDLS	*	Yaw-axis flight control jams.	Noncorrectable	<u>Instructor</u>: MNL BUCS PDLS appears on CRT. Trainee: BUCS ON and MASTER CAUTION lights illuminate, SAS damping not available (ASE switches engaged,. and CAS not available. In integrated mode, designated crewmember must break simulated shear pin. Control of other crewmember remains jammed. In independent mode, each crewmember must break simulated shear pin to remove jam and engage BUCS. If CPG engages BUCS, force trim is lost.

Table 7-16. Malfunction Details - Continued

Required malfunction	Ref number	Aircraft indications and related effects	Corrective action	Indications presented to instructor/operator and trainee
MNL BUCS CYC LAT	1	Lateral-axis flight control jams.	Noncorrectable	Instructor: MNL BUCS CYC LAT appears on CRT. Trainee: BUCS ON and MASTER CAUTION lights illuminate, SAS damping not available (ASE switches engaged), and CAS not available. In integrated mode, designated crewmember must break simulated shear pin. Control of other crewmember remains jammed. In independent mode, each crewmember must break simulated shear pin to remove jam and engage BUCS, If CPG engages BUCS, force trim is lost.

CHAPTER 8

EMERGENCY PROCEDURES AND SAFETY

Section I. EMERGENCY PROCEDURES

CAUTION

Due to abnormal shutdown possible hardware damage may occur.

NOTE

This section contains procedures to be used during an actual simulator malfunction or failure. Procedures for use during simulated malfunctions are contained in Chapter 7, table 7-16.

8-l. EMERGENCY SHUTDOWN. Emergency stop switches are provided throughout the complex for emergency shutdown of the complete CMS system, motion system only, or visual system only. Emergency shutdown can be accomplished at the following locations :

a. Complete Simulator Complex. The following are major locations of switches that shut down the complete CMS complex:

Instructor/operator stations
Trainee control panels
Digital linkage cabinet
SCE cabinet
Motion cabinets
Power cabinet
Motion pumps

b. Motion System Only. MOTION OFF switches at the ‘following locations shut down only the associated (pilot or copilot/gunner) motion system:

IOS simulator control panels
Trainee control panels
Motion cabinets

C. Control Loading System. The control loading system may be deactivated manually by depressing the MANUAL ABORT switchlight on the remote power controller panel.

8-2. SYSTEM FAILURES. Should a failure be detected, use intercom to contact the computer room and reguest maintenance. If the system failure cannot be cleared within 15 minutes, exit simulator. System failures can occur for several reasons:

Electronic failure
Hydraulic failure
Mechanical failure
Operator-induced failure

WARNING

Care should be exercised when exiting the simulator during power failure. The boarding ramp may fail to deploy.

8-3. FACILITY POWER FAILURE. Loss of facility power results in shutdown of the entire CMS complex. The total simulator becomes deactivated with the exception of the following:

Emergency lighting
Fire detection system
Ramp
Telephone intercom

Section II. SAFETY

8-4. OPERATIONAL SAFETY. The CMS is designed for safe operation during all phases of training.

WARNING

> Prior to the activation of motion, all occupants of the simulated cockpit and IOS (limited to three persons per flight compartment) are required to fasten seat belts.

a. Each motion system employs numerous devices to ensure safe operation for personnel. Among these are controlled deceleration devices, cushion stops, limit-sensing, leveling and locking devices, thermal cutout for hydraulic fluid, emergency stop switches, and red warning lights in personnel areas.

b. The entrance/emergency exit doors are equipped with safety interlocks that prevent motion activation until the door is secure.

c. The motion equipment is located within a gated area with gate interlocks that prevent motion activation unless the gates are closed.

d. The boarding ramps are equipped with sensing switches to prevent boarding ramp motion with additional weight (person) on the ramp. The motion system is not activated until the boarding ramp is completely raised.

e. Normal activation and deactivation of each motion system is accomplished at the respective IOS. Motion for each flight compartment is controlled separately and is not mode-dependent.

f. Fail-safe circuitry prevents erratic movement of the motion system when equipment malfunctions.

g. Temperature sensors are located in each equipment cabinet. If the temperature reaches 100°F or if adequate airflow is not maintained, visual and aural warnings activate in the computer room. At 110°F, the entire complex automatically shuts down.

h. Actuation of any emergency STOP switch results in the immediate shutdown of the entire complex, motion system. and/or visual system. Once an EMERGENCY STOP switch has been actuated and the power shuts down. the main and linkage circuit breakers must be manually reset before power can be reapplied.

i. In the emergency stop condition, a quick-settle control valve returns the motion platform to the settled position at the highest practicable speed. The boarding ramp lowers under power of a reserve stored energy source. Personnel can safely egress to the access balcony in approximately 24 to 31 seconds, depending on the position of the motion platform at the time electrical power was cut off.

j. Emergency escape ropes are provided in case power failure or hydraulic failure prevent a boarding ramp from deployment.

WARNING

Do not discharge a CF_3BR fire extinguisher In the confined cockpit.

k. Five fire extinguishers are located In central areas of the CMS complex. one In the computer room, two in the simulator room, and one In each pump room. Two other fire extinguishers are located in the flight simulator compartments, forming a part of the normal cockpit equipment. The fire extinguishers are monobromotrifuloromethane (CF_3BR). These fire extinguishers are caustic In nature and can seriously damage sensitive electronic equipment not already damaged by fire.

l. The visual system safety system Includes an emergency egress switch in the cockpit. Actuation of the switch causes the right window viewing head to swing away from the cockpit to allow egress.

m. In the event an anomaly called “Computer Runaway” occurs, PROBLEM FREEZE, MOTION OFF, and all communications fall to operate. The recommended procedure to halt the motion system Is to activate the RIGHT VISUAL DISPLAY CONTROL switch In the trainee station. This triggers the motion system microswitch and shuts down motion.

n. When the ownship takes a direct weapons hit, there Is a violent reaction from the motion system. The pilot station receives a 10- to 15-degree pitch-up cue and 700- to 900-knot side wind effect. The CPG station receives only the side wind effects to prevent Injury when the CPG’s face is lowered toward the cockpit display.

o. An abort, or safety, circuit Is provided on card 4 of each axis to protect against excessive control motion due to an abnormal transient Input or a hard-over condition resulting from a malfunction. The circuit senses control acceleration (derivative of velocity) and switches a high resistance in series with the servo valve torque motor when excessive control acceleration is present. Since this circuit interfaces with a solenoid-operated dump valve via the start-stop Interlock controls (SSIC), hydraulic pressure to the control loader actuators is also dumped when excessive acceleration Is sensed. The control loading system can also be aborted manually by depressing the MANUAL ABORT pushbutton on the remote power controller panel.

GLOSSARY

6-DOF	Six-degree-of-freedom

A

ADF	Autopilot direction finder
ADI	Attitude direction Indicator
ADSS	Air data sensor system
AF	Autofly
AGL	Above ground level
ALT	Altitude
AMI	Automatic malfunction insertion
AND	Alphanumeric display
APU	Auxilliary processing unit or auxilliary power unit
ARCS	Aerial rocket control system
AS	Airspeed
ASE	Aircraft survivability equipment

B

BATT	Battery
BARO	Barometric
BUCS	Backup control system

C

C	Centigrade
CB	Circuit breaker
CC	Current conditions
CDU	Computer display unit
CF_3BR	Monobromotrifluoromethane
CMD	Command
CMS	Combat mission simulator
COMM	Communication
COMP	Computer
CPG	Copilot/gunner
CPU	Central processing unit
CRT	Cathode-ray tube
CUM	Accumulative

D

DA	Department of the Army
DASE	Digital automatic stabilization equipment
DIG	Digital image generation
DISPL	Display
DNS	Doppler navigation system
DTV	Day television
DVO	Direct-view optics

E

ECS	Environmental control system
ECU	Electrical control unit
EMER	Emergency

F

F	Fahrenheit
FAB	Forward avionics bay
FARP	Forward arming and refueling point
FCC	Fire control computer
FD/LS	Fault detection and location system
FLIR	Forward-looking infrared
FLT	Flight
FWD	Forward

G

GBX	Gearbox
GCA	Ground-controlled approach

H

HAD	High-action display
HARS	Heading and attitude reference system
HDD	Heads-down display
HDG	Heading
HDST	Headset
HE	Hellfire electronics
HMD	Helmet-mounted display
HOD	Head-out display
HSI	Horizontal situation indicator
HSS	Helmet sight subsystem
HTR	Heater
HYD	Hydraulic

I

IC	Initial condition
ICS	Intercommunication system
IHADSS	Integrated helmet and display sight system
INBD	Inboard
IND	Independent
INDEP	Independent
INST	Instructor
INTEG	Integrated
IOS	Instructor/operator station
IR	Infrared

J

K

L

LDNS	Lightweight Doppler navigation set
LOS	Line-of-sight
LRF/D/T	Laser range finder/designation/tracking
LKD	Locked
LT	Light

M

MALF	Malfunction
MCS	Main computational system
MET	Mission elapsed time
MF	Manual freeze
MNL	Manual
MON	Monitor
MS	Malfunction simulation
MSL	Missile or mean sea level
MSTR	Master

N

NAV	Navigation
NOE	Nap-of-the-earth
NR	Main rotor speed

O

OBS or OBV	Observer
ORT	Optical relay tube
OTW	Out-the-window
OUTBD	Outboard
OVRD	Override

P

PA	Probability of being acquired
PAR	Precision approach radar
PDS	Program design specifications
PEN AIDS	Penetration aids
PF	Parameter freeze
PH	Probability of being hit
PLT	Pilot
PNVS	Pilot night vision sensor
PTR	Pointer
PVT	Private

Q

R

RA	Radar altitude
RCL	Recall
RD	Remote display

R - Continued

RDR	Radar
RGN	Range
RKT	Rocket
RMI	Radio magnetic indicator
RP	Record/playback
RTR	Rotor

S

S/R	Store/reset
SCAS	stability and command augmentation system
SCE	Signal Conversion equipment
SCG	Security classification guide
SEL	Select
SIM	Simulator
SYS	System

T

TADS	Target acquisition/designation sight
TEE	Target engagement exercise
TGT	Target
TQ	Torque
TRU	Transformer rectifier unit
TSU	Telescopic sight unit
TV	Television

U

UTM	Universal transverse mercator

V

VASI	Visual approach slope indicator
VDU	video display unit
VIB	Vibration
VIS	Visual
VIS FRONT	Visual (display) front
VIS L	Visual (display) left
VIS R	Visual (display) right
VRS	Video Recorder System
VS	Vertical speed

W

WAYPT	Waypoint
WD	wind direct ion
WPNS	Weapons
WT	Weight
WV	Wind velocity

X

x-c	Cross-country
XMIT	Transmit
XMSN	Transmission

Y

Z

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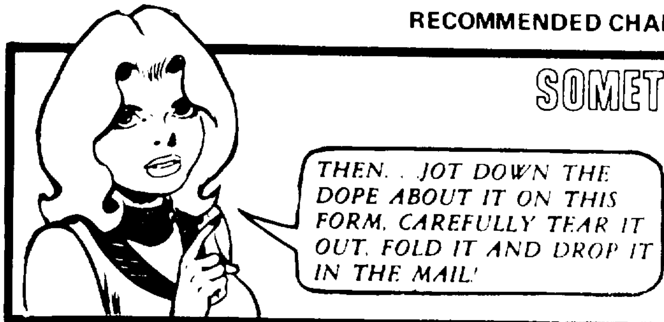

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6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 Cylinders. The engine on my set only has 4 Cylinders. Change the manual to show 4 Cylinders.
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the other.
125	line 20			I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*
inches	centimeters	2.540
feet	meters	.305
yards	meters	.914
miles	kilometers	1.609
square inches	square centimeters	6.451
square feet	square meters	.093
square yards	square meters	.836
square miles	square kilometers	2.590
acres	square hectometers	.405
cubic feet	cubic meters	.028
cubic yards	cubic meters	.765
fluid ounces	milliliters	29.573
pints	liters	.473
quarts	liters	.946
gallons	liters	3.785
ounces	grams	28.349
pounds	kilograms	.454
short tons	metric tons	.907
pound-feet	newton-meters	1.356
pound-inches	newton-meters	.11296

To change	*To*	*Multiply by*
ounce-inches	newton-meters	.007062
centimeters	inches	.394
meters	feet	3.280
meters	yards	1.094
kilometers	miles	.621
square centimeters	square inches	.155
square meters	square feet	10.764
square meters	square yards	1.196
square kilometers	square miles	.386
square hectometers	acres	2.471
cubic meters	cubic feet	35.315
cubic meters	cubic yards	1.308
milliliters	fluid ounces	.034
liters	pints	2.113
liters	quarts	1.057
liters	gallons	.264
grams	ounces	.035
kilograms	pounds	2.205
metric tons	short tons	1.102

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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