TRAINING PROGRAM OF INSTRUCTION (TPI)
FOR
DINFOS-BTVEM

Basic Television Equipment Maintenance Course

Approved by:

COL J. M.
COMMANDANT

Commandant Defense Information School
Supersedes DINFOS BTVEM TPI dated: August 2008

BROADCAST TELEVISION EQUIPMENT MAINTENANCE COURSE

TRAINING PROGRAM OF INSTRUCTION

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TRAINING PROGRAM OF INSTRUCTION

Preface

TRAINING PROGRAM OF INSTRUCTION FILE NUMBER (TPFN): DINFOS-BTVEM

TITLE: Basic Television Equipment Maintenance Course (BTVEM)

TRAINING LOCATION: Defense Information School, Fort George G. Meade, Maryland

SPECIALTY AWARDED: USA MOS 25R10

PURPOSE: To provide a course of instruction that fulfills the training requirements for MOS 25R10. Its purpose is to provide basic entry-level concepts and practical skills required to maintain and repair the major components of radio and television equipment systems.

COURSE DESCRIPTION: This course provides instruction in the fundamentals of electronics, instruction and training on direct and alternating current principles, solid-state fundamentals, including transistor amplifier theory, digital principles, and basic soldering techniques. Students then apply these basic electronic concepts to the maintenance and repair of broadcast television and radio equipment. At the conclusion of this course, the graduate will be able to use audiovisual equipment to monitor, troubleshoot, and repair computers, television cameras, videotape recorders, audio systems, broadcast studios, automated audio and visual equipment, as well as transmission systems. Additionally, graduates will be able to set-up and maintain Video Teleconferencing Systems. This course is designed for entry-level service members and is an MOS producing course. This TPI combines all of the functional areas previously taught in the Electronic Fundamentals course with the functional areas taught in BTVEM-USA/USAF courses; any reduction in hours reflects the redistribution of training hours in accordance with current Army needs and does not modify the training intent of either course. This TPI satisfies all requirements for both EFC and BTVEM.

TRAINING METHODOLOGY: The BTVEM course is a resident format only, taught at the Defense Information School in its entirety.

PREREQUISITES: Target population/prerequisite(s) waiver requests must come through the Army's career field manager to the DINFOS Commandant, for approval.

Service	**Rank / Identifier/ Etc**	**Other**
ARMY	E1 through E6	Minimum EL score of 110 on the ASVAB; have normal color vision; profile series: PUHLES 212221; cannot experience acrophobia, claustrophobia, or vertigo; and be able to lift 75 lbs.
Other Services Do Not Attend This Course		

International Students	Must have an English Comprehension Level (ECL) of 75, have normal color vision, cannot have acrophobia, be claustrophobic, or have vertigo.
Interagency	Student's pay-grade, duty position description, and selection in accordance with specific agency guidance, policy and procedures.

SECURITY CLEARANCE: None

CLASS SIZE:

MAXIMUM: 8

MINIMUM: 4

ANNUAL COURSE CAPACITY: 96

COURSE LENGTH: 124 training days

ACADEMIC HOURS:	976
ADMINISTRATIVE HOURS:	16
TOTAL COURSE HOURS:	992

INSTRUCTOR CONTACT HOURS: 1495

TYPE/METHOD OF INSTRUCTION:

LECTURE (L):	230.5	Hrs
DEMONSTRATION (D):	71	Hrs
PERFORMANCE EXERCISE (PE):	326.5	Hrs
PERFORMANCE EXAMINATION (EP):	105	Hrs
WRITTEN EXAMINATION (EW):	45.5	Hrs
COMPUTER AIDED INSTRUCTION (CAI):	197.5	Hrs
ADMINISTRATIVE (AD):	16	Hrs
TOTAL	992	Hrs

TRAINING START DATE: October 2012

ENVIRONMENTAL IMPACT: None; DoD policy was followed to assess the environmental impact.

MANPOWER: The Interservice Training Review Organization (ITRO) formula was used to determine the number of instructors required.

EQUIPMENT AND FACILITIES: The Course Design Resource Estimate (CDRE) contains this information.

TRAINING DEVELOPMENT PROPONENT: Defense Information School, Broadcast Operations and Maintenance Department, Commercial (301) 677-3886; DSN 622-3886.

OVERVIEW FUNCTIONAL AREA 1
FUNDAMENTALS OF ELECTRONICS

TPFN: DINFOS BTVEM-001

UNITS:

001 Introduction to Electronics
002 AC & DC Circuits
003 Solid State Electronics
004 Amplifier Circuits
005 Wave Shaping Circuits
006 Digital Electronics
007 Circuit Fabrication and Troubleshooting

TERMINAL TRAINING OUTCOME: The instruction and training throughout this functional area provides students with the foundational knowledge of electronics required for them to understand and perform the hands-on troubleshooting techniques practiced in later units. Upon completion of this functional area, the student will be able to identify and apply the primary principles of safety hazards associated with electronic equipment. Students will be able to use equipment to make basic circuit measurements, perform conversions using metric notation and electrical prefixes, perform math operations using powers of ten, and perform circuit analysis using component theory. Students will be able to identify basic principles of and troubleshoot resistors, switches, fuses, breakers, inductors, capacitors, transformers, relays, solenoids, diodes, transistors, power supplies, and voltage regulators. Additionally, students will be able to calculate values and troubleshoot AC/DC circuits, resistive-capacitive- inductive circuits, basic and multistage transistor amplifier circuits, operational amplifier circuits, oscillator circuits, multivibrator circuits, trigger device circuits, combinational logic circuits, register memory circuits, arithmetic counting circuits, and conversion and data circuits. Students will be able to perform electronic soldering, de-soldering techniques, and electronic cable terminations, and conduct circuit fabrication. Student competency is measured through written exams, practical exercises, and performance exams. Each student cannot fail more than four examinations in Functional Area 1.

FA HOURS AND TYPES:

Lecture (L) 65 HRS
Computer Aided Instruction (CAI) 197.5 Hrs
Practical exercise (PE) 46 Hrs
Written exam (EW) 20 Hrs
Demonstration (D) 3.5 HRS
Performance Exam (EP) 9 Hrs

FA TOTAL HOURS: 341

TPFN: DINFOS-BTVEM-001-001-

UNIT TITLE: Introduction to Electronics

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using an electronic laboratory program, students identify and troubleshoot the basic components of an electrical circuit. Students are introduced to the CAI electronic lab program, which is used extensively during the electronic fundamentals training of this course. Students thoroughly examine all safety requirements and hazards associated with electronics and perform metric conversion and math operations using scientific notation. Students then move on to identifying the basics of voltage, current, and the components of an electrical circuit as well as identifying principles of resistors, switches, fuses and circuit breakers. Students also perform circuit analysis using equipment. Students trace signals, voltage, and current through an operational circuit and troubleshoot the circuit to identify faulted components. This foundational information is applied to all subsequent lessons and is essential to the students' successful completion of this course; therefore, it is reinforced and reviewed throughout the course. The performance tasks will be tested to the performance level throughout the rest of the course. Student competency is measured through written exams.

TPFN TYPE AND HOURS: 30.5 CAI, 11.5 L, 4 EW

TPFN TOTAL HOURS: 46

PREREQUISITE TPFN: None

TASK(S):

001 Identify and comply with electronic safety applicable to electronics
002 Perform conversion using metric notation and electrical prefixes
003 Perform math operations using powers of ten (scientific notation)
004 Written Exam #1
005 Perform circuit analysis using component theory
006 Identify basic facts and principles of switches, fuses and breakers
007 Use a multimeter to make basic DC circuit measurements
008 Troubleshoot a resistor
009 Written Exam #2

REFERENCES:

- CAI software and accompanying texts

INSTRUCTOR/STUDENT RATIO: 1:8 CAI, L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-001-002-

UNIT TITLE: AC & DC Circuits

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using an electronic laboratory program, the student uses equipment to analyze and troubleshoot DC, AC, inductive, capacitive, and RCL circuits down to the component level. Students identify, analyze, and calculate mathematical formulas to identify electronic faults in a circuit. During this process, the student also identifies the relationships between voltage, current, and resistance in these circuits. Students identify AC sinusoidal and non-sinusoidal waves, frequency, cycle, and hertz. Students define the characteristics and the unit of measurement for resistance, capacitance, and inductance. Students calculate wavelength, period, peak, peak-to-peak, average, and RMS values. Students identify the in-phase and out-of-phase waveforms, amplitude, and degree of an AC waveform using vectors. Students use an oscilloscope, signal generator, multimeters, and frequency counters to measure basic electronic signals, and electronic component values. The performance tasks will be tested to the performance level throughout the rest of the course. Student competency is measured through written exams.

TPFN TYPE AND HOURS: 54 CAI, 22.5 L, 4 EW

TPFN TOTAL HOURS: 80.5

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify DC characteristics
002 Calculate unknown values in a DC circuit
003 Troubleshoot a DC circuit
004 Written Exam #1
005 Identify AC characteristics
006 Use test equipment to make basic AC circuit measurements
007 Troubleshoot an inductive circuit
008 Troubleshoot a capacitive circuit
009 Identify filter circuits
010 Troubleshoot an RCL circuit
011 Written Exam #2

REFERENCES:

- CAI software and accompanying texts

INSTRUCTOR/STUDENT RATIO: 1:8 CAI, L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-001-003-

UNIT TITLE: Solid State Electronics

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using an electronic laboratory program, the student uses equipment to analyze and troubleshoot solid-state devices in a circuit. Students identify, analyze, and calculate mathematical formulas to identify electronic faults in solid-state devices and replace electronic components in a circuit. Students will identify the purpose of schematic symbols, reference designations, and operating characteristics of relays, solenoids, diodes, transistors, and voltage regulators. Students review typical faults in transformers, clippers, clampers, and diodes; practice troubleshooting procedures; and then troubleshoot a circuit with these components. They also identify biasing for PNP and NPN transistors and operation from cutoff to saturation. This foundational information is applied to all subsequent lessons and is essential to the students' successful completion of this course; therefore, it is reinforced and reviewed throughout the course. The performance tasks will be tested to the performance level throughout the rest of the course. Student competency is measured through written exams.

TPFN TYPE AND HOURS: 26 CAI, 12 L, 4 EW

TPFN TOTAL HOURS: 42

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Troubleshoot a transformer circuit
002 Troubleshoot a relay circuit
003 Troubleshoot a basic diode circuit
004 Written Exam #1
005 Identify characteristics and principles of a transistor circuit
006 Troubleshoot a power supply
007 Troubleshoot a voltage regulator
008 Written Exam #2

REFERENCES:

- CAI software and accompanying texts

INSTRUCTOR/STUDENT RATIO: 1:8 CAI, L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-001-004-

UNIT TITLE: Amplifier Circuits

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using an electronic laboratory program, the student uses equipment to analyze and troubleshoot amplifier circuits to the component level. Students will identify the purpose and classes of amplifiers, specifically common emitter, common collector, and common base amplifier configurations. They perform operational checks of these amplifiers including observing waveforms. Students identify typical faults found in operational amplifier circuits, troubleshooting procedures used to correct them, and then participate in troubleshooting experiments. Students also identify basic facts and principles, and recognize schematic symbols and operating characteristics of special purpose devices, multi-stage, RC coupled, and push-pull transistor amplifiers. Students then perform troubleshooting experiments in which they must recognize faults in these circuits and observe the effect these faults have on the circuit. These performance tasks will be tested to the performance level throughout the rest of the course. Student competency is measured through written exams.

TPFN TYPE AND HOURS: 32 CAI, 6 L, 2 EW

TPFN TOTAL HOURS: 40

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Perform an operational check of a basic transistor and amplifier circuit
002 Troubleshoot a multi-stage transistor amplifier circuit
003 Troubleshoot an operational amplifier
004 Written Exam

REFERENCES:

- CAI software and accompanying texts

INSTRUCTOR/STUDENT RATIO: 1:8 CAI, L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-001-005-

UNIT TITLE: Wave Shaping Circuits

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using an electronic laboratory program, the student uses equipment to analyze and troubleshoot waveshaping circuits to the component level. Students identify the basic facts and principles of wave shaping circuits, to include RC time constant operation. Using a multimeter and oscilloscope, students observe a capacitor charging and discharging to verify RC time constant measurements. Students perform RC circuit transient experiments, predicting the effects and measuring voltage and current waveforms across a capacitor. They identify typical faults in RC transient circuits and troubleshooting procedures used to correct them before actually troubleshooting a basic wave shaping circuit. Students review the basic facts and principles of series, parallel, and resonant RCL circuits and unknown circuit values are calculated. Students identify characteristics and principles of sine waves, and Colpitts, Hartley, RC phase, Sawtooth, blocking, and non-sine oscillators. After reviewing troubleshooting procedures for identifying faulted components, students troubleshoot an oscillator circuit. This foundational information is applied to all subsequent lessons and is essential to the students' successful completion of this course; therefore, it is reinforced and reviewed throughout the course. The performance task will be tested to the performance level throughout the rest of the course. Student competency is measured through written exams.

TPFN TYPE AND HOURS: 29 CAI, 5 L, 2 EW

TPFN TOTAL HOURS: 36

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001Troubleshoot an oscillator circuit
002 Identify the characteristics and principles of multi-vibrator circuits
003 Identify the characteristics and principles of trigger device circuits
004 Written Exam

REFERENCES:

- CAI software and accompanying texts

INSTRUCTOR/STUDENT RATIO: 1:8 CAI, L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-001-006-

UNIT TITLE: Digital Electronics

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using an electronic laboratory program, students examine components used in normal operation for digital circuits. Students identify NOT, AND, and OR gate functions and examine digital truth tables and Boolean symbols. Students also identify operation, logic symbols, and logic schematic representation of NAND, NOR, XOR, and XNOR gates in circuit operation. Students will identify various numbering systems used in digital electronics (e.g., binary, hexadecimal, and octal). Students identify characteristics and principles of combinational logic circuits, including the definition of combinational logic, universal logic gates; and describe logic families, including integrated circuits. They use logic probes to analyze logic circuits and troubleshoot a logic circuit to predict the circuit logic state. Students examine register circuits and predict outputs, measure inputs and outputs, and identify normal circuit operations. Students identify the purpose of adder circuits and how they are used in addition, subtraction, multiplication, and division. Students will also identify the purpose and operational characteristics of ripple counters, up counters, down counters, 4-bit adders, and 4-bit subtractors as well as flip-flops circuits, D/A and A/D conversion, data selector, and data distribution circuits. Students must identify the purpose of these circuits and recognize their normal operation. This performance task will be tested to the performance level throughout the rest of the course. Student competency is measured through written exams.

TPFN TYPE AND HOURS: 25 CAI, 3 L, 2 EW

TPFN TOTAL HOURS: 30

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Troubleshoot a digital circuit

REFERENCES:

- CAI software and accompanying texts

INSTRUCTOR/STUDENT RATIO: 1:8 CAI, L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-001-007-

UNIT TITLE: Circuit Fabrication and Troubleshooting

UNIT INTERMEDIATE TRAINING OBJECTIVE: Students identify basic facts and principles of soldering and de-soldering as well as tools, equipment, and materials used in this process. Preparation steps are explained and demonstrated for both soldering and de-soldering. Students use circuit components, wires, and soldering equipment to construct a circuit onto a circuit board. The students will then troubleshoot a circuit, with an instructed inserted malfunction, down to the component level. Students' ability to perform these objectives is evaluated in written and performance exams IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 1 CAI, 5 L, 3.5 D, 46 PE, 9 EP, 2 EW

TPFN TOTAL HOURS: 66.5

PREREQUISITE TPFN: All previous TPFNs

TASK(S):

001 Identify principles of troubleshooting
002 Construct a circuit
003 Troubleshoot a circuit to component level

REFERENCES: None

INSTRUCTOR/STUDENT RATIO: 1:8 CAI, L, EW; 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

OVERVIEW FUNCTIONAL AREA 2
TELEVISION FUNDAMENTALS

TPFN: DINFOS BTVEM-002

UNITS:

001 Electrical Power
002 Corrosion Control
003 Audio/Video Signals
004 RF Transmission
005 Video Test Equipment

TERMINAL TRAINING OUTCOME: The instruction and training throughout this functional area provides initial training in basic television principles. The student is taught standard safety practices, National Television Systems Committee (NTSC) television signal characteristics, principles of transmitters, and proper use of equipment. Upon completion of this area, the student will be able to identify safety violations, and analog and digital television signal properties; and perform proper measurements of signals. Student competency is measured through written exams, practical exercises, and performance exams. Each student cannot fail more than two examinations and must successfully pass DINFOS-BTVEM-002-005-001 performance evaluation.

FA HOURS AND TYPES:

Lecture (L) 33
Demonstration (D) 6
Practical exercise (PE) 24
Performance exam (EP) 3
Written exam (EW) 6

FA TOTAL HOURS: 72

TPFN: DINFOS-BTVEM-002-001-

UNIT TITLE: Electrical Power

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using extracts from the Occupational Safety and Health Administration's (OSHA) regulations/guidelines and the DoD radiation hazard standard, the student identifies the dangers associated with radiation and electrical current to personal and equipment safety, the dangers of hazardous materials to personnel and the environment, and the OSHA and DoD standards of safety in the workplace. Additionally students describe grounding for electrical operation, review international power polarization, and examine single and multiple phase power. The student will also demonstrate the ability to apply these safety principles throughout the course during all daily classroom activities. Student competency is measured through a written exam.

TPFN TYPE AND HOURS: 3 L, 1 EW

TPFN TOTAL HOURS: 4

PREREQUISITE TPFN: None

TASK(S):

001 Describe AC power fundamentals

REFERENCES:

- OSHA 29 CFR
- www.OSHA.gov

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-002-002-

UNIT TITLE: Corrosion Control

UNIT INTERMEDIATE TRAINING OBJECTIVE: The student identifies various types of corrosion and their causes, selects control methods used to prevent and treat corrosion, and identifies proper electronic equipment grounding techniques. They also learn how to detect grounding problems and the consequences that arise from improper grounding. Student competency is measured through a written exam.

TPFN TYPE AND HOURS: 2 L, 1 EW

TPFN TOTAL HOURS: 3

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify corrosion control fundamentals

REFERENCES:

- www.OSHA.gov

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-002-003-

UNIT TITLE: Audio/Video Signals

UNIT INTERMEDIATE TRAINING OBJECTIVE: The student is introduced to basic concepts of composite video and audio to include the theories and identifiable characteristics of each. Students examine deflection and scanning, analog/digital video, fundamentals of color, digital signal processing and analog/digital audio in accordance with NTSC. Emphasis is on analog video, as the student must achieve a firm comprehension of those essential concepts and characteristics. This information is necessary to ensure student success, as it is referenced extensively throughout the course. Student competency is measured through a written exam.

TPFN TYPE AND HOURS: 24 L, 3 EW

TPFN TOTAL HOURS: 27

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify basic principles of video signals
002 Identify basic principles of audio signals
003 Written Exam

REFERENCES:

- Williams, E. (Ed). (2007). *National Association of Broadcasters Engineering Handbook - 10th Edition*. Focal Press: MA

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-002-004-

UNIT TITLE: RF Transmission

UNIT INTERMEDIATE TRAINING OBJECTIVE: The student identifies frequency allocations in the radio frequency spectrum, and technical components and characteristics of transmitting AM/FM/TV/SW signals. The student participates in a guided discussion on the different types and characteristics of antenna systems. The student is also introduced to different types of data transmission and reception, as well as the fundamentals of a studio transmitter link. The student also applies this knowledge to demonstrate performance competencies throughout studio and transmission functional areas. Student competency is measured through a written exam.

TPFN TYPE AND HOURS: 4L, 1 EW

TPFN TOTAL HOURS: 5

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify basic principles of transmitters

REFERENCES:

- Williams, E. (Ed). (2007). *National Association of Broadcasters Engineering Handbook - 10th Edition*. Focal Press: MA

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-002-005-

UNIT TITLE: Video Test Equipment

UNIT INTERMEDIATE TRAINING OBJECTIVE: Students use analog and digital test equipment to measure the composite analog and digital video signals and basic electronic signals. Students practice using all parts of this equipment to measure and verify signals IAW FCC and NTSC standards. Each student must demonstrate proficiency by successfully completing individual performance evaluations IAW criteria developed from the manufacturer's manual. The student also applies this knowledge to demonstrate performance competencies throughout the rest of the course. Competency is measured with a performance exam IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 6 D, 24 PE, 3 EP

TPFN TOTAL HOURS: 33

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Use test equipment for video measurements

REFERENCES:

- Manufacturers' Manuals

INSTRUCTOR/STUDENT RATIO: 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns fires, and the use of tools and equipment.

OVERVIEW FUNCTIONAL AREA 3
COMPUTERS AND NETWORKING

TPFN: DINFOS BTVEM-003

UNITS:

001 Computer Principles
002 Network Principles
003 Non-Linear Editing Systems
004 LAN Construction
005 Video Teleconferencing Systems

TERMINAL TRAINING OUTCOME: The instruction and training throughout this functional area provides initial training in personal computers and networking. The student is taught basic computer theory and networking fundamentals. The student is then taught basic principles of non-linear editing, how to construct a visual information (VI) network, and how to troubleshoot video teleconferencing equipment. Upon completion of this functional area, the student will be able to build a personal computer, install basic software and operating systems, identify different types of networks, and troubleshoot hardware, software, and network problems. After the completion of this functional area, the student will be able to operate and troubleshoot a non-linear editing system and establish a VTC network. Student competency is measured through written exams, practical exercises, and performance exams. Each student cannot fail more than three examinations and must successfully pass both DINFOS-BTVEM-003-001-002 and DINFOS-BTVEM-003-004-001 performance evaluations.

FA HOURS AND TYPES:

Lecture (L) 41
Demonstration (D) 16
Practical exercise (PE) 44
Performance exam (EP) 21
Written exam (EW) 6

FA TOTAL HOURS: 128

TPFN: DINFOS-BTVEM-003-001-

UNIT TITLE: Computer Principles

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using a desktop computer and references listed below, the student identifies basic computer principles. Students examine the operating system, input/output devices, audio/video card functions, and drives/storage functions of a computer. Students must also be able to perform an operations check, assemble a PC, maintain a computer system and troubleshoot a computer system to the sub-assembly level. Students' ability to perform these objectives is evaluated in written and performance exams IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 16 L, 2 D, 10 PE, 4 EP, 2 EW

TPFN TOTAL HOURS: 34

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify basic computer principles
002 Perform computer maintenance

REFERENCES:

- Manufacturers' Manual
- Mueller, S. (2010). *Upgrading and repairing PCs*. Que: IN
- Norton, P. New Inside the PC, SAMS
- White, R. (2008). How computers work, (9th Ed). Que: IN

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW; 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-003-002-

UNIT TITLE: Network Principles

UNIT INTERMEDIATE TRAINING OBJECTIVE: Students will identify principles of a LAN/WAN to include terminologies, types of computer networks, networking concepts and capabilities/limitations. Students will also terminate a network cable with RJ-45 connectors IAW Telecommunications Industry Association (TIA) and Electronic Industries Alliance (EIA) standards. Students' ability to perform these objectives is evaluated in written and performance exams IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 8.5 L, 2 D, 2 PE, 1 EP, 1.5 EW

TPFN TOTAL HOURS: 15

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify principles of LAN/WAN
002 Construct a LAN cable

REFERENCES:

- Manufacturers' Manuals
- Mueller, S. (2010). *Upgrading and repairing PCs*. Que: IN
- Norton, P. New Inside the PC, SAMS
- White, R. (2008). How computers work, (9th Ed), Que: IN

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW; 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

TPFN: DINFOS-BTVEM-003-003-

UNIT TITLE: Non-Linear Editing Systems

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using a non-linear editing system and manufacturers' manuals, the students identify principles of non-linear editors, perform selected functions of non-linear editing, and conduct maintenance on a non-linear editing system. Students examine production, scripting, shooting, the edit decision list, and NLE software. Students also conduct power up procedure, digitize, edit, delete, and export files. Additionally, students perform maintenance on the software, hardware, interfacing equipment and media files transfer/storage syste001 s. Students' ability to perform these objectives is evaluated in written and performance exams IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 3.5 L, 5 D, 9 PE, 4 EP, 1.5 EW

TPFN TOTAL HOURS: 23

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify principles of non-linear editing
002 Maintain a non-linear editing system

REFERENCES:

- Manufacturers' Manuals

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW; 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-003-004-

UNIT TITLE: LAN Construction

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using NLE's, operating system software, Cat 5 cables, Network Interface Cards (NIC) and a storage server, students will construct a VI monitor. Students will interconnect NLE's via CAT 5 cables to a network switch. Students then configure the NLEs, check for continuity, and perform an operations check on the network. Students will also use troubleshooting techniques to verify the network's operation. Competency is measured with a performance exam IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 4 D, 8 PE, 6 EP

TPFN TOTAL HOURS: 18

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Construct a VI LAN

REFERENCES:

- Manufacturers' Manuals
- Mueller, S. (2010). *Upgrading and repairing PCs*. Que: IN

INSTRUCTOR/STUDENT RATIO: 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-003-005-

UNIT TITLE: Video Teleconferencing Systems

UNIT INTERMEDIATE TRAINING OBJECTIVE: The students will refer to the manufacturers' manuals and all necessary equipment to identify the equipment used for Video Teleconferencing (VTC) and will maintain a VTC system. Students first define what teleconferencing is, then they examine how to use teleconferencing as a communication tool, review system options, its limitations, and proper coordination for its setup. Students also examine how transmission for VTC is done, examine bridging technology, and review other collaboration tools. Additionally, students assemble/ disassemble equipment, configure the camera and PC, and operate VTC software, as well as establish and monitor communications. Student's ability to perform these objectives is evaluated in written and performance exams IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 13 L, 3 D, 15 PE, 6 EP, 1 EW

TPFN TOTAL HOURS: 38

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify principles of VTC and collaboration software
002 Maintain a VTC system

REFERENCES:

- Manufacturers' Manuals

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW; 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

OVERVIEW FUNCTIONAL AREA 4
AUDIO SYSTEMS

TPFN: DINFOS BTVEM-004

UNITS:

001 Audio Principles
002 Audio Automation
003 Audio Studios
004 Audio Consoles

TERMINAL TRAINING OUTCOME: In this functional area training focuses on audio principles, automation, studios, and consoles. The student is taught proper use and setup of audio equipment in accordance with established standards. Upon completion of this functional area, the student will be able to identify proper phase and amplitude levels for audio, troubleshoot to system level, identify problems, and implement basic measures to maintain a quality audio broadcast. Student competency is measured through written exams, practical exercises, and performance exams. Each student cannot fail more than two written examinations and must successfully pass DINFOS-BTVEM-004-003-003 performance evaluation.

FA HOURS AND TYPES:

Lecture (L) 21
Demonstration (D) 13
Practical exercise (PE) 65
Performance exam (EP) 18
Written exam (EW) 3

FA TOTAL HOURS: 120

TPFN: DINFOS-BTVEM-004-001-

UNIT TITLE: Audio Principles

UNIT INTERMEDIATE TRAINING OBJECTIVE: In an audio studio with various recording, playback, storage, and amplification equipment, the student describes the path of the audio signal through the various devices and identifies the functions of each. Students also identify the circuit component schematic symbols, signal processing, and characteristics of analog and digital audio. Students identify basic principles of frequency response, impedance matching, signal to noise ratio, and balanced/unbalanced signals. The student also examines pre-emphasis/de-emphasis, signal ground, and stereo signal phasing. Using different types of microphones and other selected pieces of audio equipment that have differing input and output specifications, the student chooses the correct type of microphone to use in different environments and describes the effects various environmental conditions have on producing or reproducing audio. The student will also identify modes of compression, analog to digital conversion, and digital audio interfacing. Additionally, students examine various connectors used with audio. Student competency is measured through a written exam.

TPFN TYPE AND HOURS: 16L, 2 EW

TPFN TOTAL HOURS: 18

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify principles of audio system (analog/digital)

REFERENCES:

- Manufacturers' Manuals
- Mueller, S. (2010). *Upgrading and repairing PCs*. Que: IN
- Norton, P. New Inside the PC, SAMS
- White, R. (2008). How computers work, (9th Ed), Que: IN
- Williams, E. (Ed). (2007). *National Association of Broadcasters Engineering Handbook - 10th Edition*. Focal Press: MA

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-004-002-

UNIT TITLE: Audio Automation

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using manufacturers' manuals students identify principles, perform operations check, and perform maintenance on an audio automation system. Students review the history of and identify software used in automated audio systems. Students also record and delete cuts, build a cart, create announcer stacks, create and load playlists, and check cue tone execution. Additionally, students perform software, hardware, and media file maintenance, as well as software management. Students' ability to perform these objectives is evaluated in written and performance exams IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 5 L, 4 D, 16 PE, 8 EP, 1 EW

TPFN TOTAL HOURS: 34

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify principles of an audio automation system
002 Perform maintenance on an audio automation system

REFERENCES:

- Manufacturers' Manuals

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW; 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-004-003-

UNIT TITLE: Audio Studios

UNIT INTERMEDIATE TRAINING OBJECTIVE: In an audio studio with cable construction materials, recording and playback devices and test equipment, the student constructs a cable, wires an audio studio according to a block diagram and troubleshoots system anomalies. Students will be expected to create the cable with perfect continuity, tested with a cable tester. They will be expected to read a block diagram and correctly wire an audio studio with no signal loss. They will also be required to complete a comprehensive operations check of the studio to correctly diagnose any system errors. Once system errors are identified the student must correctly troubleshoot the studio to device level and identify the source of signal loss. Competency is measured with a performance exam IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 8 D, 41 PE, 9 EP

TPFN TOTAL HOURS: 58

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Construct an audio cable
002 Assemble an audio studio
003 Troubleshoot audio system

REFERENCES:

- *Soldier's Manual and Trainers Guide (SMTG).* MOS 25S14 STP 11-25 SM-TG 13. HQ Department of the Army: Washington D.C: Author
- Williams, E. (Ed). (2007). *National Association of Broadcasters Engineering Handbook - 10th Edition*. Focal Press: MA

INSTRUCTOR/STUDENT RATIO: 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-004-004-

UNIT TITLE: Audio Consoles

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using an audio analyzer, audio generator, associated cables and manufacturers' manuals, students will troubleshoot and use symptom recognition and symptom analysis to localize and identify a malfunction in an audio studio to board level as defined on the performance checklist. The student identifies the features and operating functions of the audio distribution system. The student then performs an operations check, alignment, and troubleshoots the audio distribution system. Students also identify the features and operating functions of the console and the equalizer; performs an operations check; and aligns the console and equalizer. Students then troubleshoot the console and equalizer. Competency is measured with a performance exam IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 1 D, 8 PE, 1 EP

TPFN TOTAL HOURS: 10

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Maintain an audio console

REFERENCES:

- Manufacturers' Manuals

INSTRUCTOR/STUDENT RATIO: 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

OVERVIEW FUNCTIONAL AREA 5
CAMERAS AND VTRS

TPFN: DINFOS BTVEM-005

UNITS:

001 Camera Principles
002 Camera Maintenance
003 VTR Principles
004 VTR Maintenance

TERMINAL TRAINING OUTCOME: The instruction and training throughout this functional area provides entry level training in basic operational theory, troubleshooting, and maintenance of both television cameras and video tape recorders. The student is taught signal tracing and video processing from origin to end user finished product. Upon completion of this functional area, the student will be able to identify optical principles, and operate, maintain, and troubleshoot inclusive equipment to board level. Student competency is measured through written exams, practical exercises, and performance exams. Each student cannot fail more than two written examinations and must successfully pass both DINFOS-BTVEM-005-002-002 and DINFOS-BTVEM-005-004-001 performance evaluations.

FA HOURS AND TYPES:

Lecture (L) 22
Demonstration (D) 9.5
Practical exercise (PE) 37.5
Performance exam (EP) 15
Written exam (EW) 3

FA TOTAL HOURS: 87

TPFN: DINFOS-BTVEM-005-001-

UNIT TITLE: Camera Principles

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using the manufacturers' manual the student describes the fundamental concepts and components of camera optical systems, and the basic principles and characteristics of images, then traces signals through the camera system. Students also examine digital signal processing principles. Students' ability to perform these objectives is evaluated in written and performance exams IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 8 L, 1.5 D, 7 PE, 1.5 EP, 1 EW

TPFN TOTAL HOURS: 19

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify basic principles of television cameras
002 Perform an operational check on a camera
003 Perform a back focus adjustment

REFERENCES:

- Manufacturers' Manuals and Block Diagrams

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW; 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-005-002-

UNIT TITLE: Camera Maintenance

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using the manufacturers' technical manual, the student identifies the principles of the television camera system and the alignments required for proper camera set-up. The student demonstrates proficiency by aligning the video signal IAW the manufacturers' specifications. The alignments enhance the knowledge-based instruction for a total understanding of the camera. Additionally, students use test equipment, alignment tools, and the manufacturers' technical manual to troubleshoot the camera and identify malfunctions to the module level. Competency is measured with a performance exam IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 4 D, 12.5 PE, 5.5 EP

TPFN TOTAL HOURS: 22

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Perform television camera electrical alignments
002 Troubleshoot a camera to module level

REFERENCES:

- Manufacturers' Manuals

INSTRUCTOR/STUDENT RATIO: 1:4 D, PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-005-003-

UNIT TITLE: VTR Principles

UNIT INTERMEDIATE TRAINING OBJECTIVE: Students examine head drum theory and the principles of analog and digital VTRs. Students then analyze the signal path through the VTR circuits, to include servo circuits, audio circuits and video/RF circuits using the manufacturers' block diagrams. Student comprehension is measured through a written examination.

TPFN TYPE AND HOURS: 14 L, 2 EW

TPFN TOTAL HOURS: 16

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify principles of video tape recorders (analog and digital)

REFERENCES:

- Manufacturers' Manuals
- Williams, E. (Ed). (2007). *National Association of Broadcasters Engineering Handbook - 10th Edition*. Focal Press: MA

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-005-004-

UNIT TITLE: VTR Maintenance

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using input signals, all appropriate test equipment, and manufacturers' technical manuals, the student performs operation checks, diagnostic checks, and routine cleaning. The student uses symptom recognition and symptom localization to isolate a fault down to board level. Additionally, students are shown how to remove and replace a carriage assembly, as well as how to remove stuck tapes. Competency is measured with a performance exam IAW the manufacturers' manuals and with no safety violations.

TPFN TYPE AND HOURS: 4 D, 18 PE, 8 EP

TPFN TOTAL HOURS: 30

PREREQUISITE TPFN: All previous TPFNs

TASK(S):

001 Perform VTR Maintenance

REFERENCES:

- Manufacturers' Manuals

INSTRUCTOR/STUDENT RATIO: 1:4 D, EP, PE

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

OVERVIEW FUNCTIONALAREA 6
STUDIO SYSTEMS

TPFN: DINFOS BTVEM-006

UNITS:

001 Studio Principles
002 Studio Installation

TERMINAL TRAINING OUTCOME: The instruction and training throughout this functional area teaches the student basic principles of maintaining and troubleshooting studios and studio equipment. At the conclusion of this functional area, the student will be able to maintain studio equipment, analyze problems, and monitor audio/video broadcast facilities. Student competency is assessed through written examinations, practical exercises, and performance examinations. Each student must successfully pass DINFOS-BTVEM-006-002-004 performance evaluation.

FA HOURS AND TYPES:

Lecture (L) 15
Demonstration (D) 13
Practical exercise (PE) 67.5
Performance exam (EP) 21.5
Written exam (EW) 3

FA TOTAL HOURS: 120

TPFN: DINFOS-BTVEM-006-001-

UNIT TITLE: Studio Principles

UNIT INTERMEDIATE TRAINING OBJECTIVE: Students will identify and contrast various types of TV studios and the essential components within them, to include sync/ signal generator, character generator, video switcher, distribution amplifier, and time base correctors/frame synchronizers, and review NTSC signals. Students will examine each piece of equipment and review its purpose within the studio. Additionally, students will review NTSC standards, system timing, and studio design and planning. Student competency is measured through a written exam.

TPFN TYPE AND HOURS: 15 L, 3 EW

TPFN TOTAL HOURS: 18

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify principles of studio systems

REFERENCES:

- Manufacturers' Manuals
- *NTSC Studio Timing: Principles and Application.* Grass Valley Group, Inc.
- Williams, E. (Ed). (2007). *National Association of Broadcasters Engineering Handbook - 10th Edition*. Focal Press: MA

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

TPFN: DINFOS-BTVEM-006-002-

UNIT TITLE: Studio Installation

UNIT INTERMEDIATE TRAINING OBJECTIVE: In a lab environment students will align a studio system to include amplifiers and system timing and phasing. Students will then build a rack for a TV studio, to include mounting of rack equipment and constructing video cables using standard cable and BNC connectors. Students will review signal grounding and power vs. signal routing. Students will also route, dress and label cables in a television studio. Students will use specified troubleshooting techniques to accurately troubleshoot the studio system down to module level. Competency is measured with a performance exam IAW the manufacturers' manuals and with no safety violations.

TPFN TYPE AND HOURS: 13 D, 67.5 PE, 21.5 EP

TPFN TOTAL HOURS: 120

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Perform alignments on a studio system
002 Construct a video cable
003 Assemble a television studio
004 Troubleshoot studio system to module level

REFERENCES: None

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW; 1:4 D, PE, EP, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

OVERVIEW FUNCTIONAL AREA 7
TRANSMISSION SYSTEMS

TPFN: DINFOS BTVEM-007

UNITS:

001 Transmission Principles and Theory
002 Transmitter Maintenance
003 Satellite Systems

TERMINAL TRAINING OUTCOME: The instruction and training throughout this functional area teaches the student basic principles of maintaining and troubleshooting transmission systems. At the conclusion of this functional area, the student will be able to maintain transmission equipment, analyze problems, and monitor audio/video broadcasts. Student competency is measured through written exams, practical exercises, and performance exams. Each student cannot fail more than one examination.

FA HOURS AND TYPES:

Lecture (L) 33.5
Demonstration (D) 6
Practical exercise (PE) 26
Performance exam (EP) 8
Written exam (EW) 4.5

FA TOTAL HOURS: 78

TPFN: DINFOS-BTVEM-007-001-

UNIT TITLE: Transmission Principles and Theory

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using block diagrams and manufacturers' manuals, the student identifies fundamental concepts, principles and characteristics of transmission systems. Students examine principles of amplitude modulation, frequency modulation, television, and shortwave transmission. Students also examine antenna systems, antenna polarization, radiation patterns, and basic installation consideration for AM, FM, TV, and SW antennas. Additionally students review the connectors used in transmission such as N type, BNC, IDF, and EIA flange. Special emphasis is placed on safety due to the extreme hazards associated with transmitters. Student competency is measured through a written exam.

TPFN TYPE AND HOURS: 25.5 L, 2.5 EW

TPFN TOTAL HOURS: 28

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify RF transmission principles and theory (AF/FM/TV/SW)

REFERENCES:

- Manufacturers' Manuals
- Williams, E. (Ed). (2007). *National Association of Broadcasters Engineering Handbook - 10th Edition*. Focal Press: MA

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires and the use of tools and equipment.

TPFN: DINFOS-BTVEM-007-002-

UNIT TITLE: Transmitter Maintenance

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using operational and technical manuals, the student safely operates equipment associated with transmitters. This includes a time domain reflectometer, sweep generator/spectrum analyzer, wattmeter, and a field strength meter. The student will also use manufacturers' technical manuals to conduct performance checks of a transmitter and perform alignments on a transmitter. Additionally, students perform frequency tuning on an agile transmitter. Special emphasis is placed on safety due to the extreme hazards associated with transmitters. Competency is measured with a performance exam IAW manufacturers' manuals with no safety violations.

TPFN TYPE AND HOURS: 6 D, 26 PE, 8 EP

TPFN TOTAL HOURS: 40

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Maintain a Transmitter

REFERENCES:

- Manufacturers' Manuals

INSTRUCTOR/STUDENT RATIO: 1:8 D; 1:4 PE, EP

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment.

TPFN: DINFOS-BTVEM-007-003-

UNIT TITLE: Satellite Systems

UNIT INTERMEDIATE TRAINING OBJECTIVE: Using manufacturers' technical manuals and block diagrams, the student will explain the characteristics of a satellite transmission system. This includes programming, digital modulation, video compression techniques, and receiver/descramblers. Students trace the signal through a satellite system, explain the purpose of various circuits within the system, describe the signal characteristics during data transmission and reception, and describe how compression techniques are used in transmitting a signal over a satellite system. Student competency is measured through a written exam.

TPFN TYPE AND HOURS: 8 L, 2 EW

TPFN TOTAL HOURS: 10

PREREQUISITE TPFN: All previous TPFN's

TASK(S):

001 Identify principles of satellite transmission systems

REFERENCES:

- AFRTS. (2010). *AFRTS Broadcast Center Satellite Handbook.* V.3.26. Defense Media Activity
- Frenzel, L. (2007). *Principles of Electronic Communication Systems*. McGraw-Hill Companies
- Williams, E. (Ed). (2007). *National Association of Broadcasters Engineering Handbook - 10th Edition*. Focal Press: MA

INSTRUCTOR/STUDENT RATIO: 1:8 L, EW

SAFETY FACTORS: Students must follow all safety precautions pertaining to electrical shock, burns, fires, and the use of tools and equipment

OVERVIEW FUNCTIONAL AREA 8
FIELD TRAINING EXERCISE

TPFN: DINFOS BTVEM-008

UNITS:

001 Deployable Operations
002 Satellite Operations

TERMINAL TRAINING OUTCOME: The instruction and training throughout this functional area teaches the student the basics of maintaining and troubleshooting deployable transmission equipment. At the conclusion of this functional area, the student will be able to maintain deployable transmission systems, analyze problems, and monitor satellite uplinks/downlinks. Student competency is measured through practical exercises and performance exams. Each student must successfully pass all tasks for Functional Area 8.

FA HOURS AND TYPES:

Demonstration (D) 4
Practical exercise (PE) 16.5
Performance exam (EP) 9.5

FA TOTAL HOURS: 30

TPFN: DINFOS-BTVEM-008-001-

UNIT TITLE: Deployable Operations

UNIT INTERMEDIATE TRAINING OBJECTIVE: In a field environment using a wattmeter, router/switcher, waveform monitor, vectorscope, audio signal generator, video signal generator, AV monitor, parabolic dish, distribution amplifier, multimeter, patch panel, associated cables, and required manufacturers' manuals, the students setup and perform operations check on a wire antenna system. Students conduct a site survey, ensure proper grounding of equipment, and coordinate transmission. Special emphasis is placed on safety due to the extreme hazards associated with transmitters. All procedures will be done IAW manufacturers' guidelines and safety protocols. Competency is measured with a performance exam IAW manufacturers' manuals with no safety violations.

TPFN HOURS AND TYPE: 2.5 D, 10.5 PE, 5 EP

TPFN TOTAL HOURS: 18

PREREQUISITE TPFN: All previous TPFNs

TASK(S):

001 Perform deployable transmitter setup and operations check
002 Erect a wire antenna system

REFERENCES:

- Manufacturers' Manuals

INSTRUCTOR/STUDENT RATIO: 1:4 D, PE, EP

SAFETY FACTORS: Students must observe all safety precautions concerning the proper use of tools, equipment, and vehicles.

TPFN: DINFOS-BTVEM-008-002-

UNIT TITLE: Satellite Operations

UNIT INTERMEDIATE TRAINING OBJECTIVE: In a field environment using appropriate test equipment and manufacturers' technical manuals, students set up a parabolic dish, power up integrated satellite receiver decoder, and align the dish to acquire a satellite signal. After setting up the satellite, the student uses symptom recognition and symptom elaboration to localize an instructor-inserted fault down to module level. Special emphasis is placed on safety due to the extreme hazards associated with satellite systems. Competency is measured with a performance exam IAW manufacturers' manuals with no safety violations.

TPFN HOURS AND TYPE: 1.5 D, 6 PE, 4.5 EP

TPFN TOTAL HOURS: 12

PREREQUISITE TPFN: All previous TPFNs

TASK(S):

001 Perform satellite acquisition

REFERENCES:

- Manufacturers' Manuals
- Microwave Transmitter

INSTRUCTOR/STUDENT RATIO: 1:4 D, PE, EP

SAFETY FACTORS: Students must observe all safety precautions concerning the proper use of tools, equipment, and vehicles.

OVERVIEW FUNCTIONAL AREA 9
COURSE ADMINISTRATION

TPFN: DINFOS BTVEM-009

UNITS:

001 Course Administration

TERMINAL TRAINING OUTCOME: Students complete in-processing, out-processing, course critiques and graduate IAW DINFOS POPMAN.

TPFN HOURS AND TYPES:
Administration (AD): 16

TPFN TOTAL HOURS: 16

TPFN: DINFOS BTVEM-009-001-

UNIT TITLE: Course Administration

UNIT INTERMEDIATE TRAINING OBJECTIVE: Self-explanatory

TPFN HOURS AND TYPES: 16 AD

TPFN TOTAL HOURS: 16

PREREQUISITE TPFN: N/A

TASK(S):

001 Orientation/In-processing
002 Mid-course critique
003 End-of- course critique
004 Out-processing RQM
005 Out-processing Course
006 Out-processing Detachment
007 Graduation Practice/Ceremony
008 Out-Processing Installation

REFERENCES:

- DINFOS Policy and Procedures Manual

INSTRUCTOR/STUDENT RATIO: 1:8 (AD)

SAFETY FACTORS: N/A

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29 CFR Occupational Safety and Health Regulations (OSHA Standards). http://osha.gov/pls/oshaweb/searchresults.relevance?p_text=29%20CFR&p_osha_filter=STANDARDS&p_logger=1www.OSHA.gov Retrieved August 18, 2011

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