Appendix A

WORK PROCESS SCHEDULE
Protective Signal Installer
Security and Fire Alarm Systems Installer
O*NET-SOC CODE: 49-2098.00 RAPIDS CODE: 0459

This schedule is attached to and a part of these Standards for the above identified occupation.

1. TERM OF APPRENTICESHIP

The term of the occupation shall be four (4) years with an OJL attainment of 8,000 hours supplemented by the required hours of related instruction.

2. RATIO OF APPRENTICES TO JOURNEYWORKERS

The ratio of apprentices to Security and Fire Alarm Systems Installers shall be xx (x) apprentices to xx (x) journeyworker (no more than two (2) apprentices to one (1) journeyworker). [Enter the ratio for your local area. Example: one (1) apprentice to one (1) journeyworker]

3. APPRENTICE WAGE SCHEDULE

Apprentices shall be paid a progressively increasing schedule of wages and fringe benefit payments based on a percentage of the hourly journeyworker wage rate which shall be
$ [enter journeyworker wage rate here].

4 Year Progression Example:

Period	Hours	Related Instruction	Percentage of Journey Wage
1st	1000	1st Year / 1st Semester *	50 % and fringe benefit payments
2nd	1000	1st Year / 2nd Semester *	55 % and fringe benefit payments
3rd	1000	2nd Year / 1st Semester *	60 % and fringe benefit payments
4th	1000	2nd Year / 2nd Semester *	65 % and fringe benefit payments
5th	1000	3rd Year / 1st Semester *	70 % and fringe benefit payments
6th	1000	3rd Year / 2nd Semester *	75 % and fringe benefit payments
7th	1000	4th Year / 1st Semester *	80 % and fringe benefit payments
8th	1000	4th Year / 2nd Semester *	90 % and fringe benefit payments

***** Upon receiving a satisfactory evaluation

4. **SCHEDULE OF WORK EXPERIENCE** (See attached Work Process Schedule)

The UATC may modify the Work Process Schedule to meet local needs prior to submitting these Standards to the appropriate Registration Agency for approval.

5. **SCHEDULE OF RELATED INSTRUCTION** (See attached Related Instruction Outline)

Appendix A

WORK PROCESS SCHEDULE
Protective Signal Installer
(Security and Fire Alarm Systems Installer)
O*NET-SOC CODE: 49-2098.00 RAPIDS CODE: 0459

Description: A Protective Signal Installer (Security and Fire Alarm Systems Installer) is an individual whose primary occupation is the design and/or integration, installation and field maintenance/service of:

- Cabling infrastructure and products that transport low voltage (less than 100 volts) voice, video, audio and data signals in a commercial or residential premises;
- Products that capture and display or otherwise annunciate signals;
- Products that control signals; and
- Products that use signals to control mechanical and electrical apparatus.

On-the-Job-Learning (OJL)

The apprentice will practice the following work processes, demonstrating competency in them over the course of the four (4) years of the program. This constitutes the OJL portion of the apprenticeship. Each general work process is further broken down into specific constituent processes for clarification.

Work Processes	Approx. Hrs
Prepare for System Installation ▪ Review & understand electronic system requirements & documentation (blueprints, etc) ▪ Perform site survey ▪ Develop overall job plan ▪ Organize technical work plan ▪ Complete pre-assemblies & fabrication of sub systems ▪ Gather inventory /parts ▪ Pre-test components ▪ Inventory tools	800
Wire Buildings ▪ Use documentation to lay out components ▪ Secure work area; drop cloths, safety cones, etc. ▪ Rough in device component locations ▪ Install cable support structure or drill wire paths ▪ Pull & secure wire ▪ Label tag wire/cable per documentation	800
Trim ▪ Pre-termination functions o Prepare cable ends o Route cable ▪ Connect passive devices o Connectors	1,500

    - Outlets
    - Patch panels
- Splicing
- Intermediate termination

Install Components 1,500
- Remote location components
- Central/main location

Configure – Program 500
- Calibrate & align electronically and physically
- Install or enter control programs, if applicable (complex)
- Set up system instructions, labels, etc (simple)

Test, Troubleshooting, Debug 800
- Power up
- Operate and test functions
- Evaluate performance
- Identity problems, errors, discrepancies
- Diagnose causes of problems
- Take remedial action
- Document actions (see documentation section)

Train Users 500
- Review user documentation manuals & instructions
- Identify training objectives
- Confirm actual users and their requirements
- Procure or develop training & user aids, manuals, etc.
- Demonstrate system function by guiding users through the system
- Observe user using the system (have customer demonstrate knowledge of the system)
- Communicate results of training back to all relevant parties

Documentation 800

Review final blueprints, writing diagrams, and hookup instructions
- Complete work reports and time sheets
- Provide/prepare/deliver system documentation
    - User manual and training materials
    - As built drawings
    - Zone diagrams
    - Equipment lists
    - Warranty paperwork

Maintenance & Repair 800
- Maintenance
    - Perform scheduled preventive maintenance
- Repair
    - Diagnose problems

Read documentation

Total Hours 8,000

RELATED INSTRUCTION OUTLINE
Protective Signal Installer
(Security and Fire Alarm Systems Installer)
O*NET-SOC CODE: 49-2098.00 RAPIDS CODE: 0459

The instructional portion of these Standards are designed to employ the ESA NAP in a series of publications, materials, classroom and/or electronic media instruction developed or selected by ESA for the electronic security and fire alarm systems industry.

1st Year	**Approx. Hours**
Introduction to the Trade Review of the purpose and scope of the electronic systems industry. Explain the technician's role in the industry. State the rules for professional and ethical conduct. Describes the importance of codes and standards and explains how they affect the work of a Protective Signal Installer.	2
Effective Communication Skills Introduces the student to reading and writing skills necessary for the occupation including active listening.	2
Employability Skills Explains the construction business and work skills for entering the workforce. Includes work ethic, conflict resolution and other common workplace issues.	2
Basic Safety Provides an overview of safety rules and how they relate to company safety policies and OSHA regulations. Discusses the cause of accidents and introduces personal protective equipment.	7.5
Basic Safety Part II Introduces particular safety issues including ladders, scaffolds, fire prevention and electrical safety guidelines.	7.5
Basic Construction Math Provides refresher practice in addition, subtraction, multiplication, and division of whole and fractional numbers.	5
Basic Construction Math Part II Introduces the concept of decimals and reviews conversion of decimals to fractions or percentages.	5

Basic Construction Math Part III 5
Introduces the metric system and converting measurements between existing systems. Also introduces construction geometry and the area and volume of shapes.

Introduction to Hand Tools 5
Explain the selection, inspection and use of common hand tools, including hammers, screwdrivers pliers and measuring tools.

Introduction to Hand Tools Part II 5
Introduces other hand tools including saws, rasps, chisels and wrenches. Also reviews safety and maintenance issues.

Basic Rigging 8
Introduces various types of slings and hitches and reviews various rigging hardware components.

Basic Rigging Part II 8
Provides safety and operational practices relative to stress and load control.

Introduction to Blueprints 4
Introduces the different types of blueprint plans including civil, architectural, structural, mechanical and electrical.

Introduction to Blueprints Part II 4
Reviews the basic components of blueprints, including title blocks, lines, symbols, and revision symbols.

Introduction to Power Tools 5
Explains the selection, inspection, use and maintenance of common power tools including electrical, pneumatic, and hydraulic tools.

Construction Materials & Methods 5
Covers the uses and composition of common types of residential and commercial building materials. Reviews the major structural components of residential and commercial buildings and common methods of construction.

Construction Materials & Methods Part II 5
Introduces specific building systems and concepts such as fire stopping and ceiling systems. Explains how to install plywood on a gypsum board wall and on concrete.

Construction Materials & Methods Part III 5
Explains how to select the appropriate drills, bits, and cutting tools for making openings in various types of construction materials. Introduces stud finders and fish tapes.

Pathways and Spaces 5
Introduction to raceways and conduit including metallic and non-metallic tubing, rigid and flexible conduit and related fittings.

Pathways and Spaces Part II 5
Orients Apprentice to various types of cable trays, under floor systems and controlled environment vault.

Fasteners & Anchors 5
Reviews the variety of fasteners and anchors available and how to install them.

Hand Bending of Conduit 5
Review the various methods of hand-bending and installing conduit. Review how to use geometry to determine conduit bends. Assess various kinds of conduit bends, and cutting, reaming, and threading of conduit.

Job Site Safety 6
Review safe working procedures in a construction environment. Explains the purpose of OSHA and how it promotes safety on the job. Reviews electrical hazards and how to avoid or minimize them in the workplace. Explains safety issues concerning lockout/tag out procedures and other personal protection methods.

Job Site Safety Part II 6
Introduces safety relative to specific tools such as scaffolds, ladders, hoists and cranes. Presents specific safety hazards such as solvents, asbestos and batteries. Discusses proper lifting techniques and entry into designated risk areas.

Low-Voltage Cabling 7.5
Explains the various sizes and gauges of wire in accordance with the American Wire Gauge (AWG) standards and describes how to determine the proper gauge for an application. Reviews how to read and identify markings on conductors and cables. Describes the different materials from which conductors are made. Describes the different

types of conductor insulation. Describes the color-coding of insulation. Introduces various types of cable including coaxial, optical fiber, twisted pair and more.

Low Voltage Cabling Part II 7.5
Reviews procedures to plan and set up for a cable pull. Explains how to properly install a pull line for a cable pulling operation. Explains how to prepare the ends of conductors for pulling and safety pull cable through conduit in vertical and horizontal pathways. Reviews how to wrap, tie, fasten, label, and protect cable, and explains the importance of maintaining the proper slack. Describes the installation of cables in cable trays.

Low Voltage Cabling Part III 7.5
Review the restrictions imposed by the NEC on the uses of various types of cable. Review Class I, II and III circuits and non power/power limited fire alarm circuits. Introduces grounding, bonding and Electromagnetic Interference (EMI) considerations.

1st Year Hours Total: 144.5

2nd year **Approx. Hours**

DC Circuits 8
Explains the difference between conductors and insulators and how voltage, current, and resistance are related to one another. Covers the Atom and teaches how to use the formula for Ohm's law to calculate an unknown value. Describes the function of resistors and explains their color codes.

DC Circuits Part II 10
Explains the different types of meters used to measure voltage, current, and resistance. Instructs how to use the power formula to calculate the amount of power used by a circuit. Explains the basic characteristics of series, parallel, and series-parallel circuits and how to calculate the voltage drop and current in series, parallel, and series-parallel circuits by using Kirchhoff's laws. Also covers Loop Equations.

AC Circuits 8
Instructs how to calculate the peak and effective Voltage or current values for an AC waveform and

how to calculate the phase relationship between two AC waveforms.

AC Circuits Part II 8
Covers resistance, inductance, and capacitance in AC circuits. Explains factors affecting capacitance and capacitive reactance. Introduces RL, RC, LC, and RLC circuits.

AC Circuits Part III 8
Demonstrates the effect that resonant frequency has on impedance and current flow in a series or parallel resonant circuit. Introduces types of transformers, their construction, turns, and voltage ratio.

Semiconductors and Integrated Circuits 6
Introduces the fundamentals of semiconductors and integrated circuits including the components, diodes, rectifiers, and transistors. Explains the difference between printed circuit boards, integrated circuits, and microprocessors.

Semiconductors and Integrated Circuits Part II 8
Explain basic digital gates including and/or parameters. Introduces the concept of amplifiers and inverters.

Basic Test Equipment 6
Covers selection, inspection, use, and maintenance of common electrical test equipment, including meters, oscilloscopes, wattmeter's, frequency meters, continuity testers, recording instruments, and RF analyzers.

Power Quality and Grounding 8
Introduction to the electrical generation and distribution system from the utility to premises wiring. Introduces lightning protection. Explains the purpose for grounding of electrical systems.
National Electrical Code® (NEC®) regulations pertaining to grounding and bonding are thoroughly covered.

Power Quality and Grounding Part II 8
Power system protection and conditioning equipment is introduced to control voltage transients and surges. Also introduced are voltage regulators, noise suppression filters, and other power conditioning devices.

Power Quality and Grounding Part III 5
Introduces DC, linear, and non-linear power supplies. Discusses various battery types and the selecting and testing of power supplies. Presents cable shielding and grounding techniques to minimize EMI.

Introduction to Electrical Blueprints 6
Explains the basic layout of a blueprint including the title block, electrical prints, drawings, and symbols. Apprentices learn the types of information they can find on schematics, one-line drawings, and wiring diagrams.

Introduction to Electrical Blueprints Part II 4
Introduces the various scales in blueprints including architects, engineers, and metric scales. Discusses the development of site plans and typical site electrical plans. Introduces special electrical systems plans.

Introduction to Electrical Blueprints Part III 4
Introduces riser and wiring diagrams and various methods including cable, baseline, lineless, and point to point. Addresses written specification and how they are written and formatted.

Switching Devices and Timers 4
Presents the principles of operation and describes the different types and configurations of switches and their classification and typical wiring. Introduces basic switch devices including photoelectric, infrared, motion, and proximity sensing devices.

Switching Devices and Timers Part II 4
Describes the uses and operation of relays, explaining the differences between electromechanical and solid-state relays. Introduces different types of relays including reed, magnetic, and general purpose relays. Introduces temperature considerations and overvoltage and overcurrent protection.

Switching Devices and Timers Part III 4
Introduces timers including synchronous switches, solid state and programmable electronic time switches.

Wire and Cable Terminations 4
Introduces coaxial cable including connections, terminations and management. Introduces BNC and F connectors and cable testing.

Wire and Cable Terminations Part II 4
Introduces UTP cable and connectors to achieve proper cable routing and methods of dressing cables at consolidation points or cross connect panels. Introduces cable management hardware and typical termination procedures.

Wire and Cable Terminations Part III 4
Introduces typical type 110 block termination procedures. Additionally discusses modular jack, surface-mount box, and modular plug termination procedures. Introduces testing twisted-pair cable.

Wire and Cable Terminations IV 4
Introduces various connectors including solderless, crimp, splice-type crimp and wire nuts. Discusses conductor preparation, crimping tools, and procedures. Goes in depth with various solder type connections and procedures (including de-soldering wires and components).

Introduction to Codes and Standards 5
This module describes the scope and content of the major codes and standards that apply to the life safety, security, and other low-voltage systems. Determines which codes and standards to follow and how to deal with code deviation and conflicts.

Introduction to Codes and Standards Part II 5
Introduction to the NEC®
(NFPA 70) including its layout, body, and reference portion. Emphasizes navigation and text in the NEC®. Introduces the National Fire Alarm Code® (NFPA 72) and the Life Safety Code® (NFPA 101). References National Building Codes, ANSI/TIA/EIA telecommunications standards and introduces National Electrical Manufacturers Association (NEMA) and Nationally Recognized Testing Laboratories (NRTL).

Computer Applications 5
Reviews common terms related to computers. Reviews the components of a personal computer

and explains the function of each. Introduces the concepts of removable storage media, operating systems, and application software.

Computer Applications Part II 5
Introduces network hardware including hubs and routers and various physical connections and transmission techniques. Discusses local area networks (LAN), synchronization, and multiplexing. Introduces protocols and the OSI reference model.

Advanced Test Equipment 5
Introduces advanced test equipment including the Megohmmeter (Megger), cable toner, and sound level pressure meter. Describes safety precautions in this realm.

2nd Year Hours Total **150**

3rd Year	**Approx. Hours**

Cable Selection 5
Introduces low voltage cable conductors and installation. Explains how to calculate voltage drop for various applications using a variety of methods and presents how to size cable conductors for a given load. Practice in applying various formulas and charts for load calculations. Introduces calculations to cover different types of systems.

Cable Selection Part II 5
Covers the selection of cables for specific application. Explains how to interpret and apply NEC® regulations governing conductors and cables. Introduces PLTC, unshielded twisted-pair cable (UTP), shielded twisted-pair cable (STP), and other cable types. Explains common cable applications and cable signal loss considerations.

Busses and Networks 3
Introduces the data highway and various communication protocol including serial, parallel, and Universal Serial Bus (USB). Explains the function of each level of the open systems interconnection (OSI) reference

model for data communication. Presents the operating principles of various network topologies including, star, ring, bus, and hybrid. Discusses various concepts including polling, token passing, and collision detection.

Busses and Networks Part II 3
Introduces common network nomenclature and protocols. Presents the concepts of the Ethernet and the internet and introduces IP addressing.

Busses and Networks Part III 3.5
Introduces Local Area Networks (LAN) and presents the concept of Basic Input/Output System (BIOS), Operating Systems (OS), and networking software. Discusses the hardware used for linking computers including bridges, routers, and gateways. Further introduces Wide Area Networks (WAN), network security, and transmission methodologies.

Fiber Optics 7.5
Explains the basic principles of fiber optic technology, including: fundamentals, benefits, and applications of fiber optic systems. Describes the design, operation, and performance of a fiber optic transmitter and receiver. Identifies the types and construction of fiber optic detectors. Explains the desirable features and connector losses of a fiber optic connector or splice.

Fiber Optics Part II 5
Explains the installation of fiber optic cabling and support equipment, the applications and types of fiber optic splicing/termination, and testing procedures for fiber optic systems.

Video Systems 7.5
Describes the basic components of video technology and introduces various types of video including composite video and S-video. Reviews other video standards.

Video Systems Part II 5
Presents overview of digital video signaling, including HDTV. Discusses concepts such as resolution, aspect ratio, viewing angle, response time, and brightness and contrast. Introduces new hardware including LCD and plasma displays, and projection systems.

Wireless Communication 7.5

Introduces basic wireless communication principles Including modulation, analog & digital signals, and multiplexing. Introduces common hardware including transmitters, receivers, antennas and repeaters. Discusses system configuration including frequency ranges and range of operation.

Wireless Communication Part II 5

Introduces wireless personal communication and the major formats Time Division Multiple Access (TDMA) and Code Division Multiple Access (CDMA). Introduces IR and FM systems as well as wireless computer networks. Describes at length satellite communication with areas of service and satellite orbits. Describes specialized tools including RF field strength analyzer and RF power meter.

Site Survey, Project Planning and Documentation 7.5

Describes the general procedure and steps involved when estimating a job for the purpose of submitting a bid. Review how to interpret contractual documents, working drawings, and specifications pertaining to a job to determine the requirements and scope of the work. Explains how to perform a site survey in order to establish or confirm the installed locations of new and/or existing equipment and the routing of the related cabling. Reviews how to develop a schedule for accomplishing a job or task from start to finish that efficiently accomplishes the work and is also compatible with the work performed by other trades.

Site Survey, Project Planning and Documentation Part II 5

Describe the general procedures for accomplishing a job, including the control of materials, tools, equipment and assigning an installation crew. Upon completion of a project describes the punch list, acceptance test, or other documentation. Presents concepts such as liens, change orders, project logs, and operation and maintenance manuals.

Introductory Skills for the Crew Leader 5

Describes the role of the supervisor in the construction industry. Defines an organization chart and explains why it is important to know where you fit in. Describe the personal qualities and various traits of an effective leader/supervisor. Explain how to communicate effectively. Describes motivational techniques and how they are used to get others to perform. Explains

the various elements of leadership and how these are used by the supervisor on the job site. Describe the systematic problem-solving technique when dealing with personnel problems.

Introductory Skills for the Crew Leader Part II 5
Describes the three phases of a construction project and the three types of project delivery systems. Explains the two major stages of planning and the importance of planning and documenting one's work. Describes the estimating process. Teaches how to control the main resources of a job: materials, tools, equipment, and labor.

Intrusion Detection Systems 5
Introduces local and monitored intrusion systems and their four main components: the detection sensors, annunciation devices, control panels, and the methods in which these systems communicate off premises.

Intrusion Detection Systems Part II 5
Introduces UL requirements relative to intrusion systems and presents false alarm prevention concepts.

Intrusion Detection Systems Part III 5
Discusses general installation guidelines including workmanship, wiring protection, fire stopping and other wiring considerations. Introduces the concepts of primary and secondary power, grounding, and specialty detection systems.

Intrusion Detection Systems Part IV 5
Discusses programming options employed in intrusion systems including: entry/exit delays, perimeter vs. interior zones and other programmable options. Presents the concept of inspection, testing, and maintenance and introduces system troubleshooting guidelines.

CCTV Systems 5
Provides a typical CCTV systems overview. Introduces multiple camera viewing via switchers, splitters, and multiplexers. Introduces the importance of lighting and illumination and provides methods of measuring light and reflectivity.

CCTV Systems Part II 5
Introduces CCTV system components including cameras, lenses, mounts, enclosures, monitors, and other specialty components. Introduces CCTV in the digital domain.

Access Control Systems 5
Introduces the concept of electronic access control (EAC) and its major components. Reviews the electromechanical components controlled by the EAC system including: electric strikes, magnetic locks, and electrified lock sets. Provides installation guidelines, tips and procedures.

Fire Alarm Systems 5
Provides fire alarm systems overview and introduces codes & standards governing their installation, maintenance, and testing. Introduces types of fire alarm systems and typical fire alarm circuits. Introduces the National Fire Protection Association (NFPA) and its most relative section NFPA 72.

Fire Alarm Systems Part II 5
Explains the difference between initiating devices, notification appliances, and supervising stations.

Fire Alarm Systems Part III 5
Contains the minimum requirements for the installation of fire warning equipment for use in the family living quarters. Explains proper inspection, testing, and maintenance of these systems.

Fire Alarm Systems Part IV 7.5
Introduces fire alarm system components such as heat and smoke detectors. Discusses conventional vs. addressable commercial detectors. Introduces types of FACU circuits, outputs, and listings.

Fire Alarm Systems Part V 5
Introduces communications and monitoring of fire alarm systems. Discusses the installation of uncommon fire protection devices. Explains detector location and smoke spread phenomenon and stratification.

Fire Alarm Systems Part VI 5

Introduces various systems that might be connected to a fire alarm system. Introduces inspection, testing, and maintenance including troubleshooting guidelines. Presents the concept of central station certificated systems.

Systems Integration 10

Presents the big picture concepts for connecting two or more stand-alone systems together that will improve the capabilities of each system. Describes the best practices for interoperability and system performance. Explains the various interconnection options and protocols commonly used for integration. Covers network configurations used, wiring schemes and fault-tolerant procedures designed for system redundancy. Covers graphic user interfaces and custom application-driven solutions commonly used in today's high tech building automation systems.

System Commissioning and User Training 8

Describes the industry's best practices for project close-out and end user required training. Explains documentation and owners' manuals that are required. Describes levels of training required based on owners personnel ranging from system operators to facility managers. Covers the basics in final testing and close-out procedures on typical systems and how to build this in as part of the overall project.

Maintenance and Repair 8

Explains the difference between maintenance and repair. Describes the general approach to troubleshooting a problem. Reviews the common causes of system and equipment failures. Reviews procedures for isolating common problems in a system or software and common faults in wiring and equipment. Reviews common preventive maintenance measures and the method used to determine the frequency and extent of preventive maintenance.

3rd Year Hours Total **173**

4th Year	Approx Hours

Nurse Call & Signaling Systems 15

Covers basic emergency call and duress system requirements based on facility type. Explains the different system configurations and wiring schemes based on system type. Describes the installation procedures based on facility types and the U.L. and other building code specifications that dictate the use of these systems. Explains the connectivity options to auxiliary devices such as remote signaling systems, PBX and pages, electronic beds and other systems. Describes the requirements for proper grounding and static discharge tolerance on the components. Covers system troubleshooting and testing procedures along with code compliance.

Audio Systems 15

Describes audio system components including sources, amplification equipment, signal processing devices and reproduction devices. Describes fundamental technical audio issues such as room acoustics, background noise, free space attenuation and echoes. Explains power requirements, cabling options, system configurations and basic design considerations. Covers standard procedures for system installation from a building code perspective and best practices for system testing and troubleshooting. Reviews the common test equipment used during installation and troubleshooting.

Media Management Systems 10

Explains the basic principles behind shared media resources and access to them via a computer network or hardwire application. Describes media types used for origination sources both on an analog and digital platform including optical storage devices. Explains cabling options including fiber optic interfaces, broadband and base band systems and twisted pair topologies. Describes user interfaces and software commonly used for this application. Reviews installation practices, common testing and troubleshooting procedures and user training techniques.

Rack Assembly 15

Describes the best practices for assembling electronic system enclosures including power sequencing, grounding, weight distribution and heat dissipation. Explains cable routing based on signal levels being transmitted within the rack. Describes structural requirements and seismic considerations for various environments and applications. Explains electrical

power distribution and load calculation for equipment being housed within the rack. Covers electrical inspector's expectations for power and connection to the building grounding system.

Broadband (MATV) Systems 10

Describe the major elements of head-end design and installation including antenna or satellite options, receivers and modulators, and amplification and distribution devices. Explain coaxial and optical fiber distribution methods and the function of all devices used to distribute signals for an internal or external system. Cover proper signal levels, cable attenuation, insertion loss and acceptable carrier-to-noise levels. Explain the common test equipment and troubleshooting procedures.

Internet Protocol in Electronic Security 15

Introduces router configuration including port forwarding, access rules, DMZ settings, and Power Over Ethernet (POE). Provides concepts for Wi-Fi security including MAC screening, encryption and broadcast of SSID. Discusses working with IT departments regarding bandwidth and security issues.

Home Automation 10

Introduces the most common types of home automation integration including security, lighting, HVAC control, and video. References other integration such as weather notification, intercom, telephone, and home entertainment systems. Discusses technologies that link individual systems including line carrier, mobile applications, wireless distribution, and Local Area Networks (LANs).

Advanced Access Control 10

Presents advanced access control concepts including biometric data collection devices (fingerprint, retinal scan, and palm readers). Introduces door hardware considerations for special applications including fire separations and the means of egress (introduction to NFPA 80). Covers ADA considerations for product selection and installation. Introduces specialty application like gate control.

Advanced Fire Alarm Systems 15

Emphasizes referenced codes in NFPA 72 such as NFPA 70, NFPA 90A, NFPA 13, and NFPA 110. Includes standards developed by other Standards Development Organizations (SDO) such as Underwriters Laboratory (UL) and the International Code Council (ICC). Provides information on fire alarm system

detection components such as line heat detectors, duct, beam, and video smoke detectors. Introduces additional notification appliance option such as Voice Evacuation Systems, Strobe Light Synchronization, and Mass Notification Systems. Provides additional fire alarm systems integration such as elevator recall, air handling shut down, door or curtain release and stairwell pressurization. Reviews considerations related to system design and specialized applications including understanding the construction process, general project management processes, coordinating with related trades, and understanding the bidding process including surety bonds.

Advanced Video Systems 10

Introduces the concepts of Local Area Networks (LANs) and Wide Area Networks (WANs) and Network Video Recorders (NVRs). Reviews the criticality of understanding a manufacturers set up / programming to obtain the desired video. Discusses video storage concepts such as event and motion triggering for maximum storage and ease of review. Presents the latest (ever changing) hardware such as HD and megapixel cameras and transmission methods.

Central Monitoring Station Communication 12

Discusses the technologies in use for transmitting data to the central monitoring station including POTS, cellular, VOIP, long range radio, and internet. Introduces the hardware employed by the central station to receive and manage this data. Presents alarm reporting formats including 4 x 2, ASCI, contact ID. and SID amongst others. Describes the translation of reporting formats into data useable for alarm and data retransmission. Also describes signal management capabilities of monitoring station automation systems. Reviews other monitoring technologies including two way voice, video verification, and more.

Alarm Dispatch Management and Public Safety Relations 10

Introduces basic alarm dispatch management concepts such as Model Ordinances, Enhanced Call Verification (ECV) and control panel programming standards such as CP01. Emphasizes the need to create an encompassing strategy for an entire company including the sales presentation, installation, client training and follow up service. Provides the best practice of standardization of equipment offerings to manage long term alarm dispatch management goals. Covers future enhancements including video and audio dispatch verification.

Presents the need to communicate with public safety officials on an ongoing basis providing information and training to assist them with their mission. Emphasizes regular visits, support of the departments, and a determination to resolve issues.

Business Ethics 5

Introduces a Code of Ethics to assist apprentices in providing products and services to the public in a highly ethical manner. Highlights the impact apprentices have on their customers; public emergency response agencies; their piers; competitors; and the general public.

Contracts, Liability, Insurance 5

Emphasizes the importance of installation and service contracts in the alarm industry. Explains the importance of including contractual provisions relating to limitations of liability and/or liquidated damages, third-party indemnification and the customer's three-day right of rescission. Provides an overview of terms and conditions which should be addressed in a customer contract as well as a checklist to use in contract preparation. Discusses important insurance concepts such as errors and omissions coverage and the difference between claims made and occurrence based policies.

4th Year Hours Total **157**