

ELECTRONIC SYSTEMS CERTIFIED TECHNICIAN (ESC-T)

For Electronic Systems Technicians with at least 2 years of field experience.

NOTE: This is the master document on which the exam is built. CEDIA resources such as classes, books, and online training are designed to support this body of knowledge. Please refer to the **ESC-T Exam Prep Resources** document to find which resources support each area of study.



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CERTIFIED
TECHNICIAN

Domain **1** General Technician Roles and Responsibilities (12%)

Task 1: Maintain a “safety first” mindset by understanding and following personal and property safety procedures and preventing accidents in order to prevent harm to self and others. (4%)

KNOWLEDGE OF:

1. Applicable local and regional codes/articles specific to personal safety and accident prevention (on-site and off-site)
2. Applicable national/local electrical codes specific to personal safety and accident prevention
3. Applicable construction codes specific to safety and property protection
4. Motor vehicle safety and accident prevention
5. Basic first aid treatments and procedures for minor incidents
6. Emergency procedures for major incidents
7. Typical on-site safety meeting: types of information, rules and procedures
8. Company safety policies
9. Proper use and care of hand and power tools
10. Proper use and care of ladders and scaffolds

SKILL IN:

1. Interpreting applicable codes/laws
2. Analyzing a situation and choosing/applying the correct solution
3. Recognizing potentially hazardous situations and reacting accordingly
4. Basic first aid techniques
5. Emergency procedures
6. Operating a motor vehicle safely
7. Operating job related heavy equipment (personnel lifts, etc.) safely
8. Care and use of personal protective equipment (PPE)
9. Safe use of hand and power tools
10. Safe use of ladders and scaffolds

CEDIA JOB TASK ANALYSIS (EXAM BLUEPRINT)

Task 2: Represent the company by demonstrating appropriate professional behavior, reporting work activities, and engaging in best practices. (4%)

KNOWLEDGE OF:

1. Typical company reporting methods
2. Company management structure and chain of command (communications)
3. Timecards, work/change orders (daily, on-going personal, and project tracking reporting methods)
4. Personal and professional behavior and appearance
5. Workplace/jobsite etiquette and professionalism

SKILL IN:

1. Reading and interpreting common company documents
2. Using personal and project tracking/reporting methods
3. Following directions accurately
4. Using clear, concise communications
5. Handling difficult situations/conflict resolution
6. Working well with builders and other trades

Task 3: Use project documentation by interpreting, creating or modifying appropriate field documents as required, in order to confirm compliance with design specifications. (3%)

KNOWLEDGE OF:

1. Proposals, bill of materials, pick lists, and inventory logs
2. System overviews/summaries (functional)
3. Architectural plans (floor, elevation, detail, etc.)
4. Schedules (time, wire, materials, etc.)
5. Charts
6. Design/engineering drawings (block diagrams, line drawings, point-to-point schematics, cabinetry, mechanical, etc.)
7. Instruction and service manuals
8. Understand the importance and proper use for typical field document
9. Basic redline procedures and document updates

SKILL IN:

1. Reading and interpreting typical field documents
2. Creating necessary documentation that is clear and concise for others to follow
3. Modifying documentation properly using approved methods
4. Assisting project supervisor in document revision (redlines, as-built)
5. Writing clearly and legibly

CEDIA JOB TASK ANALYSIS (EXAM BLUEPRINT)

Task 4: Compute project related data using relevant technical and mathematical equations, terms, and principles in order to ensure successful completion of work. (2%)

KNOWLEDGE OF:

1. Algebra
2. Geometry
3. Electronics industry specific math
4. Decibels (dB)
5. Fractions and decimal (conversion)
6. Ohm's Law
7. Basic electricity/power management (high voltage types, outlets types, power supplies, power distribution, etc.)
8. Basic audio – analog & digital (signal types, levels, frequencies, noise, bandwidth etc.)
9. Basic video – analog & digital (signal types, levels, bandwidth, etc.)
10. Basic communications (telephone, intercom, signal types, signal levels/voltages, RF, etc.)
11. Basic data and networking (signal types, bandwidth, IP, etc.)
12. Basic control systems (data rates, polarity, relays, contact closure, voltage, metadata, feedback)

SKILL IN:

1. Interpreting typical industry related mathematics
2. Interpreting typical industry related terminology
3. Understanding when and how to properly use industry specific mathematics
4. Understanding when and how to properly use industry specific terminology
5. Solving typical industry related problems using proper mathematic equations
6. Converting fractions to decimals and decimals to fractions
7. Application of Ohm's Law

Domain Infrastructure (Pre-wire & Trim-out) (14%)

Task 1: Pre-wire an electronic system as specified in order to facilitate proper performance of audio, video, control, and related subsystem devices. (7%)

KNOWLEDGE OF:

1. Cable/wire types, applications
2. Construction, structural techniques, requirements, and issues
3. Device installation techniques (Pre-wire/First-Fix)
4. Device placement
5. Wire dressing
6. Ventilation
7. Space requirements
8. Suspended/hanging device requirements
9. Outside service provider requirements (Telco/Cat 5/ISP/SAT) / Demarcation point
10. Fire rated back boxes and other special circumstance devices and provisions
11. Wire/cable identification (types/labeling)

SKILL IN:

1. Installing proper wire/cable for a specific purpose as specified
2. Understanding of proper installation methods/requirements of cabling and devices
3. Installing mounting devices (rings, brackets, back-boxes, etc.)
4. Relating theory to practical applications
5. Deductive reasoning, problem solving, and application of theory
6. Hand and power tool usage
7. Communicating with other trades proficiently
8. Understanding outside service provider requirements (Telco, Cat 5, ISP, SAT)

Task 2: Trim-out an electronic system by labeling, terminating, and testing cables then properly mounting and installing trim related devices in order to support installation of audio, video, control, and other subsystem devices. (7%)

KNOWLEDGE OF:

1. Termination methods of needed cable, connector, and signal types
2. Types of termination tools and their appropriate use
3. Applicable codes and standards related to (Trim-out/Second-Fix) activities
4. Typical (Trim-out/Second-Fix) related tools and their proper use
5. Test tools, verifying results

SKILL IN:

1. Properly terminating all common cable, connector, and signal types
2. Identifying and using typical termination devices and tools
3. Interpreting applicable codes and standards
4. Testing/verification of terminations and signal quality
5. Troubleshooting and correcting, based on test results
6. Using label makers
7. Proper cable installation and dressing
8. Reading/filling out cable schedules

Domain **3** Equipment Mounting (11%)

Task 1: Install equipment into a rack or cabinet while providing for proper ventilation, power management, and mounting considerations in order to facilitate ease of use and maximize performance. (5%)

KNOWLEDGE OF:

1. Cabinet design and construction
2. Proper equipment layout and mounting techniques
3. Safe and secure equipment mounting
4. Rack and cabinet ventilation (active and passive)
5. Ventilation requirements for specific equipment
6. Risks associated with improper ventilation
7. Rack construction and accessories

SKILL IN:

1. Identifying various cabinet parts
2. Laying out equipment properly in a cabinet (best practices)
3. Mounting equipment/accessories in racks and cabinets
4. Assembling rack/equipment systems
5. Identifying different rack types/specific uses
6. Installing ventilation equipment
7. Proper cable/interconnect management

Task 2: Physically mount system components such as cameras, flat panel displays, and projectors by installing the proper brackets, housings, and mounting hardware to provide proper performance and safety. (3%)

KNOWLEDGE OF:

1. Types of display mounting brackets and their uses
2. Types of projector mounting brackets and their uses
3. Types of camera mounting brackets and housings along with their uses

SKILL IN:

1. Installing various types of display brackets and mounting devices
2. Installing various types of projector mounting hardware and devices
3. Installing various types of camera brackets, housings, and mounting devices

Task 3: Install power management devices such as surge suppressors, battery backups, and power conditioners in order to ensure safe and maximized performance of installed systems. (3%)

KNOWLEDGE OF:

1. Basic device recognition
2. Basic device purpose
3. Basic electricity and electrical distribution

SKILL IN:

1. Properly installing power devices and equipment
2. Basic set-up and use of power devices and equipment

Domain **4** Audio/Video Systems (12%)

Task 1: Set up audio devices such as sources, amplifiers, and speakers in order to produce a desired listening experience. (6%)

KNOWLEDGE OF:

1. Basic audio device recognition (analog and digital)
2. Basic audio device purpose

SKILL IN:

1. Identifying audio devices/components, and their interconnections
2. Basic installation of audio related devices and equipment

Task 2: Set up video devices such as sources and displays, in order to produce a desired viewing experience. (6%)

KNOWLEDGE OF:

1. Basic video device recognition (analog and digital)
2. Basic video device purpose (analog and digital)
3. Basic signal flow and cable characteristics (analog and digital)

SKILL IN:

1. Basic installation of video devices, interconnects, and accessories

Domain **5** Communications (Telephony, Data, Cctv, and RF) (22%)

Task 1: Set up basic telephony devices such as POTS and DECT phones and intercoms in order to establish basic voice communication. (1%)

KNOWLEDGE OF:

1. Basic phone/communication device recognition (including doorbells, intercoms, etc.)
2. Basic phone/communication devices (purpose)
3. RF spectrum consumption of phone/communication systems
4. Testing strategies for phone/communication systems

SKILL IN:

1. Basic installation, configuration, and testing of phone/communication devices
2. Completing typical phone/communication systems documentation

CEDIA JOB TASK ANALYSIS (EXAM BLUEPRINT)

Task 2: Set up a basic data network using typical home network devices (such as routers, switches, and wireless access points) in order for local connected devices to communicate with each other and with the Internet. (13%)

KNOWLEDGE OF:

1. Physical layer connectivity methods
2. Wired network topology
3. Levels 1,2 & 3 of the OSI model
4. TCP/IP protocols including MAC and IP addressing
5. Basic network device functionality
6. Basic network security threats
7. Network monitoring services

SKILL IN:

1. Terminating category cables
2. Domestic router setup and testing
3. Connecting and configuring wireless access points
4. Assigning IP addresses
5. Installing a simple network monitoring device
6. Completing network documentation

Task 3: Install and configure basic security and surveillance devices such as cameras and sensors in order to provide basic monitoring of secured areas.(4%)

KNOWLEDGE OF:

1. Basic CCTV/security devices (recognition)
2. Basic CCTV/security devices (purpose)
3. Effects of devices on human comfort and behavior
4. Likely legal implications of CCTV/security installation

SKILL IN:

1. Basic installation of CCTV/Security devices
2. Configuration of CCTV/Security devices
3. Completing typical CCTV/security documentation

Task 4: Set up terrestrial antenna, cable, and satellite (RF) TV systems, distribution, and equipment in order to provide proper reception of TV signals. (4%)

KNOWLEDGE OF:

1. RF modulation theory
2. Antenna type recognition and typical uses
3. Spectrum consumption of typical Off-Air/Cat 5/DBS devices
4. Recognition of Off-Air/Car 5/DBS devices

SKILL IN:

1. Basic installation of Off-Air/Cat 5/SAT related devices
2. Basic set-up and use of Off-Air/Cat 5/SAT related devices
3. Testing of Off-Air/Cat 5/SAT related devices
4. Completing typical Off-Air/Cat 5/SAT system documentation

Domain IntegratedControl Systems (16%)

Task 1: Set up basic control devices such as remotes, keypads, volume controls, touch screens in order to allow user control over electronic devices and systems. (11%)

KNOWLEDGE OF:

1. Basic control devices (recognition)
2. Basic control devices (purpose)flow
3. Basic protocols and methods
4. Interface technologies (RS232, RS485, RF, IR, contact closure, relays, IP)
5. Third party interface technologies (Trend, LONworks, Modbus, KNX, C Bus, BACnet, BACnet IP)
6. Local safety regulations and laws (swimming pool covers, gas fires, car lifts)
7. System demarcation lines, fault finding, and control responsibilities
8. Power management, UPS, and battery back up

SKILL IN:

1. Basic installation and setup of control related devices
2. Basic cabling requirements for systems integration
3. Basic wiring pin outs and topologies for interface technologies

Task 2: Set up basic lighting control devices such as keypads, dimmers and diming interfaces in order to allow user control over the lighting system. (5%)

KNOWLEDGE OF:

1. Basic lighting control devices (recognition)
2. Basic lighting control devices (purpose)
3. Lamps types (incandescent, LED, Fluorescent, HiD, cathode)
4. Basic switching and dimming control protocols and methods (Forward and Reverse phase, 0-10v, DALI, DMX512)
5. LED lamp technology (constant voltage, constant current, PWM, ccr, series and parallel wiring)
6. Load types (resistive, inductive, capacitive and inrush)
7. Safe isolation and local electrical codes
8. Power Law

SKILL IN:

1. Basic installation and setup of lighting devices
2. Identifying lamp types
3. Identifying load types
4. Identifying dimming protocols
5. Fault finding problematic circuits

Domain System Verification and Testing (13%)

Task 1: Review the installed system in order to confirm compliance with design specifications. (7%)

KNOWLEDGE OF:

1. All system components and how they relate to the overall system functionality
2. System wiring, termination, and signal flow
3. Proper system operation
4. Audio and video formats, resolution, data rate, and surround modes
5. Basic calibration procedures and terminology (audio and video)

SKILL IN:

1. Deductive reasoning
2. Interpretation of results
3. Understanding and using equipment and all associated devices
4. Reading instruction manuals
5. Verifying component operation
6. Navigating menus
7. Systematic, methodical procedures
8. Documenting results accurately
9. Using appropriate test equipment: meters, continuity, data rate, RF, etc.

Task 2: Verify system performance by testing device and system functionality in order to confirm proper operation. (6%)

KNOWLEDGE OF:

1. Techniques and methods for troubleshooting devices/systems
2. Basic understanding of methods to correct problems
3. Commonly used test equipment
4. Common failure modes
5. Troubleshooting techniques

SKILL IN:

1. Using appropriate test equipment
2. Deductive reasoning
3. Diplomacy, tact, accountability, and patience on the jobsite
4. Basic troubleshooting