Skill India
कौशल भारत-कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

ESSCI
Skilling India in Electronics

Participant Handbook

Sector
Electronics

Sub-Sector
IT-Hardware

Occupation
After Sales Support

Reference ID - **ELE/Q4611, Version 1.0**
NSQF Level 4

Security System Installation Technician

Published by

First Edition, October 2018

Printed in India at
New Delhi – 110016

Electronics Sector Skills Council of India
602-608, 6th Floor, Ansal Chambers-II, Bhikaji Cama Place
New Delhi-110066
E-mail: info@essc-india.org

"Skilling is building a better India. If we have to move India towards development then Skill Development should be our mission."

Shri Narendra Modi
Prime Minister of India

Skill India
कौशल भारत-कुशल भारत

ESSCI

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

Certificate

COMPLIANCE TO

QUALIFICATION PACK - NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

ELECTRONICS SECTOR SKILL COUNCIL OF INDIA

for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role/ Qualification Pack: **" Security System Installation Technician "** QP No. **"ELE/Q4611, NSQF Level 4"**

Date of Issuance : March 10th, 2018
Valid up to* : March 10th, 2020
*Valid up to the next review date of the Qualification Pack or the 'Valid up to' date mentioned above (whichever is earlier)

Authorised Signatory
(Electronics Sector Skill Council)

Acknowledgements

The need for having a standard curriculum for the Job Role based Qualification Packs under the National Skills Qualification Framework was felt necessary for achieving a uniform skill based training manual in the form of a participant handbook.

I would like to take the opportunity to thank everyone who contributed in developing this handbook for the QP Security System Installation Technician.

The handbook is the result of tireless pursuit to develop an effective tool for imparting the Skill Based training in the most effective manner.

I would like to thank the team of KontentEdge for their support to develop the content, the SME and the team at the ESSCI along with the industry partners for the tireless effort in bringing the handbook in the current format.

CEO

Electronics Sector Skills Council of India

About this Book

This Participant Handbook is designed to enable training for the specific Qualification Pack (QP). Each National Occupational (NOS) is covered across Unit/s.
Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS.

- Explain the basics of electronic security systems
- Describe the different types of electronic security systems
- Describe the roles and responsibilities of a security system installation technician
- Identify the tools and equipment required for installation
- Explain the measurement of different parameters
- Describe the various aspects of site inspection
- List the methods to securely install cables
- Describe the steps of routing the cables on site
- Explain the step-by-step process of installing various devices
- Identify the ways of testing equipment for errors
- Explain the steps for securely installing the security systems
- List the steps for installing software and configuring it to network
- Explain how to check tools and equipment
- Describe preliminary fault check process
- Identify risks and hazards
- List the precautions related to health and safety hazards
- List safe working standards
- Identify the warning signs and labels
- Describe the importance of team work
- Explain work requirements and SOP
- Explain work etiquettes

The symbols used in this book are described below.

Symbols Used


Key Learning Outcomes


Steps


Role Play


Tips


Notes


Unit Objectives


Activity


Practical

Table of Contents

Skill India
कौशल भारत-कुशल भारत

सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP

N·S·D·C
National
Skill Development
Corporation
Transforming the skill landscape

1. Introduction to Electronic Security System

ELE/N4619

Key Learning Outcomes

At the end of this module, you will be able

1. Explain the basics of electronic security systems
2. Describe the different types of electronic security systems
3. Describe the roles and responsibilities of a security system installation technician
4. List the technical skills required by a security system installation technician
5. Define electrical terms and Ohm's law
6. Explain electrical circuits and their types
7. Identify the elements of an electrical signal
8. Describe the types of power supplies
9. Explain the basics of Earthing system
10. Explain the different types of cables used in a security system
11. List the different types of connectors and the cable supporting accessories
12. Explain the basics of networking

UNIT 1.1: Electronic Security Systems

Unit Objectives

At the end of this unit, you will be able to:

1. Describe the purpose of electronic security systems
2. Explain the role of electronic security systems
3. List the benefits of electronic security systems
4. Categorize the electronic security systems based on their functioning
5. Describe the different types of electronic security systems

1.1.1 Purpose of Electronic Security Systems

Electronic security systems are electronic equipment which can perform security operations such as surveillance, access control, alarm sound generation or intrusion control for an area. Electronic systems use power sources such as mains supply or battery power. These systems can also involve electrical or mechanical operations.

The following image shows various types of electronic security systems:

Fig. 1.1.1: Electronic security systems

Role of Electronic Security Systems

Electronic security systems give various types of security leverages to a ll premises to restrict the access of any individual inside them. The government sector is a major area which uses electronic security administration. The commonly used electronic security systems comprise of CCTVs (close-circuit televisions) surveillance systems, biometric access control systems and alarm systems.

The following figure shows the role of electronic security systems:

Fig. 1.1.2: Role of electronic security systems

Importance of Electronic Security Systems

Nowadays, electronic security systems are used in most of the sectors such as home security, work place or commercial place security and so on. The security systems are also used in public areas such as bus stands and railway stations. The systems are easy to install and use because of their easy remote operation and reliability. The security systems installed in any place give a sense of security to the people of that place and decrease the rate of crimes.

The following figure shows the importance of electronic security systems:

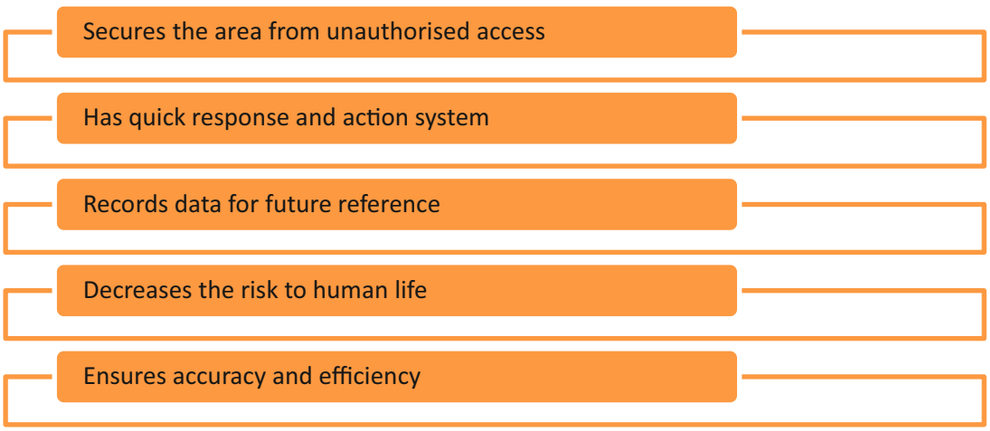

Fig. 1.1.3: Importance of electronic security systems

1.1.2 Classification of Electronic Security Systems

The classification of the electronic security systems can be done on various aspects such as functioning, use of technology and conditions of use. Primarily, they can be categorised on the basis of functioning.

The following figure shows the classification of security systems based on their functioning:

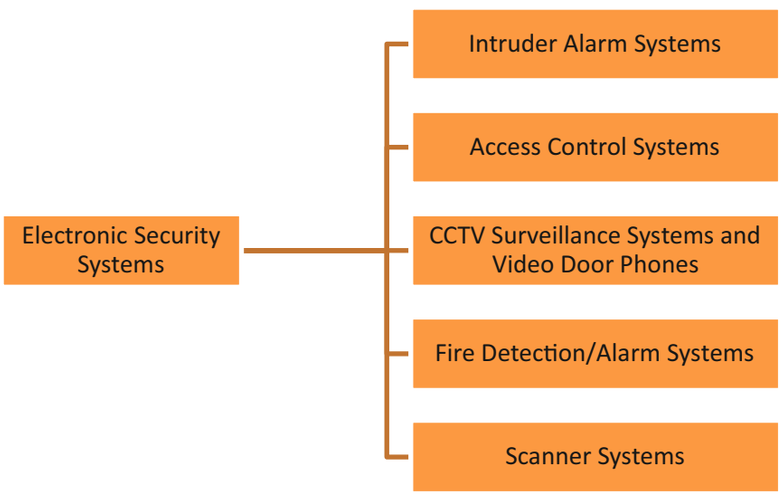

Fig. 1.1.4: Classification of electronic security systems

Intruder Alarm Systems

It is a set of interconnected devices which work to protect a facility or any object from intruders or burglars and inform the right owner about the breach in the security. The security system can be of any type; it can be a simple system which is used to protect a house from any kind of intrusion or any advanced system which involves various devices connected together to protect an area. The following are some of the systems that are included in an intruder alarm system:

- **Door Switches:** In an intruder alarm system, the door switches work to secure the doors and alarm the owner when any unauthorised person tries to open the door. These involve sensors and magnets which are activated during the working operation that is usually at night or whenever the premises require to be secured. When any intruder tries to open the door, the sensors trigger the alarm.
  The following image shows a door switch that used in an intruder alarm system:

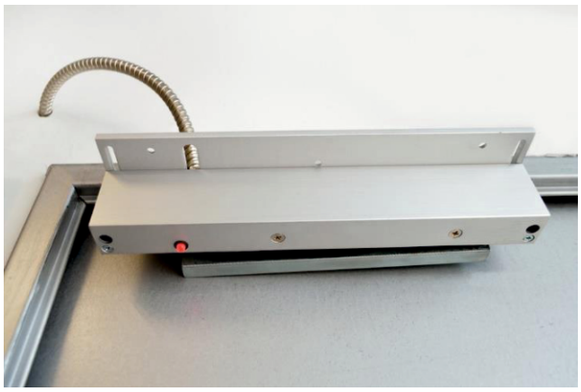

Fig. 1.1.5: Door lock switch

- **Glass Break Sensors:** These are sensors which are installed on windows and door glasses. They get activated when someone tries to break them to breach the facility.
  The following image shows a glass sensor mounted on a window glass:

Fig. 1.1.6: Glass break sensor

- **Linear-beam Sensors:** This type of security system works on laser or infra-red beams which are not visible through human eyes. The transmitter transmits the beam towards the receiver. If any unauthorised person tries to cross the area, the beams received by the receiver are restricted and thus the alarm triggers.
  The following image shows a linear-beam alarm system:

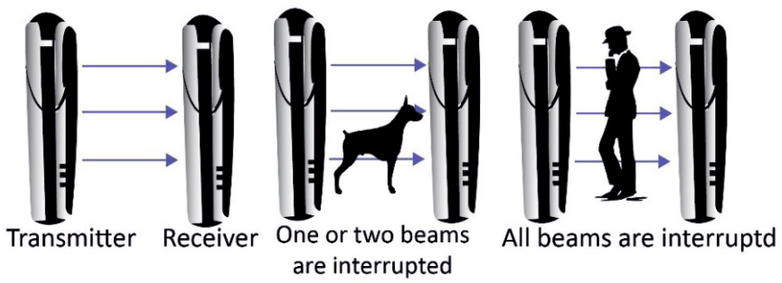

Fig. 1.1.7: Linear-beam sensors

- **Pressure/seismic Sensors:** These sensors are installed on floors. They warn the owner when they detect any movement in the area through the pressure that is created when any person enters the facility and steps on them.
  The following image shows a pressure sensor established on a floor:

Fig. 1.1.8: Pressure sensors

- **Electromagnetic Field Sensors:** The electromagnetic field sensors are basically installed on shops for preventing shoplifting. The electromagnetic wave transmitter and receivers are installed on the door and the products are tagged with special tags. These tags are detected by the electromagnetic sensors.
  The following image shows electromagnetic field sensors:

Fig. 1.1.9: Electromagnetic field sensors

- **Buried-ported Coaxial Cables:** The buried ported coaxial cable system is a security measure in which coaxial cables are buried in the soil. This creates a high dielectric region. If any metal or human interference is felt in the region, the alarm goes off.
  The following figure shows a buried ported coaxial cable security system:

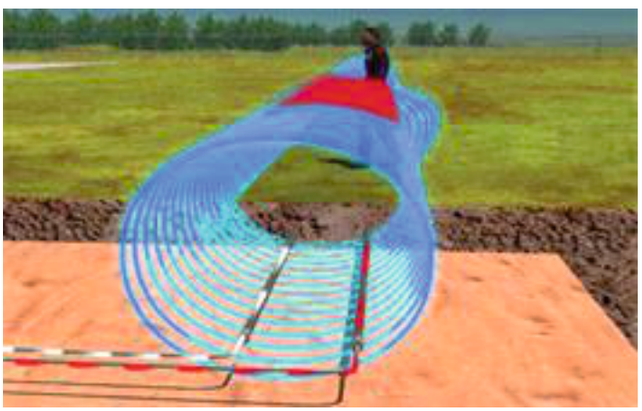

Fig. 1.1.10: Buried ported coaxial cable sensor system

- **Buried fibre-optic Cable Sensor Systems:** This system is basically made up from fibre optics. The light ray travels in the cable which is buried. If there is any disturbance in the light ray caused as a result of change of light diffraction and intensity over the length of the cable, then this change is measured at the end of the cable; this triggers the alarm.
  The following image shows a buried fibre optic cable sensor system:

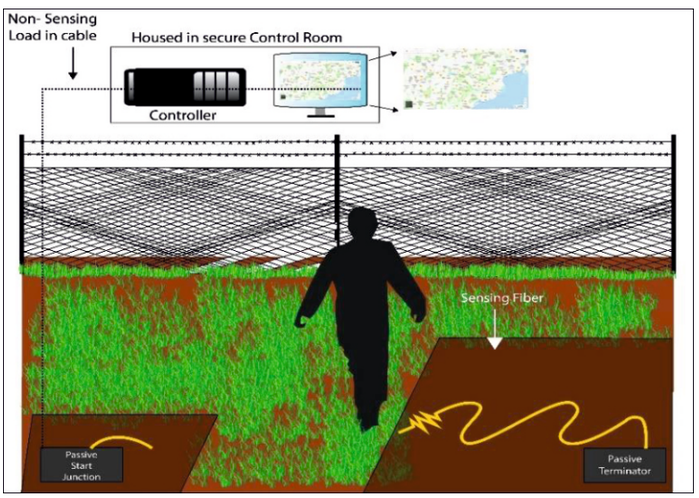

Fig. 1.1.11: Buried fibre optic cable sensor system

Access Control Systems

Access control systems are the systems which provide secure access only to authorised persons in any facility. Basic use of this can be seen as attendance providing systems incorporated in offices. The user credentials are uploaded in the systems and then the identity is verified at the time of user entry by means of password thumb impression or card readers.

The following are some of the systems that are included in access control systems:

- **Proximity:** These control systems are installed at the entry of a facility with a door lock system connected to it. When an authorised person tries to access the system by using any means of a security key, the system verifies the data saved in it with the en tered key and allows the user to enter the premises.
  The following image shows a proximity security system:

Fig. 1.1.12: Proximity security system

- **PIN Access:** This system allows the user to enter a numeric PIN as a key into the security system and then, allows the user to enter the facility.
  The following image shows a PIN access security system:

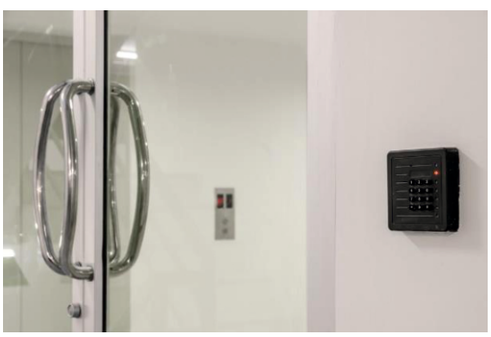

Fig. 1.1.13: PIN access security system

- **Biometrics:** These systems use biometric identification as a key to access any facility. This may include finger print scans, retina identification, facial identification and so on. Biometric access systems are more accurate than other access systems as they are difficult to be broken.
  The following image shows a biometric security system using finger print access:

Fig. 1.1.14: Biometric security system

- **Door Lock:** The door lock systems are systems which are attached to the doors and keep the doors locked with magnetic or mechanical locks. When an authorised person unlocks the door after verifying the identity through a key, the door mechanism allows the user to enter the facility.
  The following image shows a door lock security system:

Fig. 1.1.15: Door lock security system

- **Radio frequency identification (RFID) System:** In these systems, the security control system scans the tags through a radio frequency and then verifies the identity through the saved data. This is mostly seen in card verification systems used in office areas.
  The following image shows an RFID security system:

Fig. 1.1.16: RFID security system

- **Smart Card:** In this type of systems, the information of an authorised individual is filed in a card with a magnetic strip, and when the user swipes the card through the security system, the identity is verified, and the individual is allowed access.
  The following image shows a smart card security system:

Fig. 1.1.17: Smart card security system

CCTV Surveillance Security Systems

This type of security systems provides a video-based surveillance system with the help of special cameras. The cameras, which can work day and night to give images of good quality and can cover a large area, are mounted in the facility and then, the video feed is recorded or can be monitored from screens for surveillance purpose. These are basically used where real time monitoring is required and for storing evidences.

The following are some of the systems that are included in a CCTV surveillance security system:

- **Digital Video Door Phone:** This security system is installed on the entry gate of premises with a camera. It allows getting a real time video feed to check the identity of the person wanting to enter the premises.
  The following image shows a digital video door phone security system:

Fig. 1.1.18: Digital video door phone security system

- **IP Camera:** These are internet protocol (IP) based camera systems which are connected to computer systems to record the video surveillance footage. These are installed in public areas where 24x7 surveillance is required.
  The following image shows an IP camera security system:

Fig. 1.1.19: IP camera security system

- **Digital Video Recorder (DVR)/ Network Video Recorder (NVR)** : A DVR records the video footage of the place under surveillance and transmits the footage to a controller box which stores it. An NVR records the video and transfers the video footage through internet network connectivity for storage and surveillance.
  The following image shows a DVR security system:

Fig. 1.1.20: DVR security system

- **Analog Camera:** This system consists of an analog camera which also has a sensor that detects the motion in a specified area. The camera takes the footage as soon as any motion is detected by the camera sensor.
  The following image shows an analog camera integrated with a sensor:

Fig. 1.1.21: Analog camera security system

Fire Detection/Alarm Systems

This type of security system alerts the surrounding people in case there is a fire condition so that they can get time to stop any further damage by controlling the fire. This involves smoke and heat detectors which detect the fire in its initial stage.

The following are the types of fire detection and alarm systems available:

- **Fire Detection and Alarm:** These systems are used to detect fire by detecting the smoke and the heat through the use of sensors. These sensors activate the alarm and alert the people in the facility. They can also enable the fire sprinklers to control the fire.

The following image shows a fire detection alarm system:

Fig. 1.1.22: Fire detection and alarm security system

- **Gas Leak Detection:** This type of systems is used to detect leakage of any kind of gas or a specific gas in a facility environment. Such a situation can be hazardous for the people in the vicinity. The system includes a sensor which detects the gas presence and an alarm system which is triggered by the sensor.
  The following image shows a gas leak detection system:

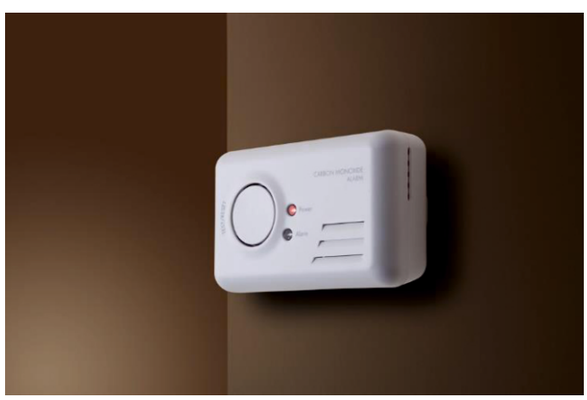

Fig. 1.1.23: Gas leak detection system

Scanner Systems

Scanner systems are automated systems which check the identity of any individual by checking a unique pattern and comparing it with the records. These include card scanner, finger print scanner and so on.

These are more reliable as they are accurate and can be used at a greater level for a large number of users.

- **Door Frame Metal Detector:** These are systems which are installed at the entry of any facility to check the entry of any unwanted substance such as metal objects (which are objectionable). This allows individuals to pass through it and checks by electromagnetic radiation for any unwanted material, if detected the alarm turns on.