

Contents

PART I THE BASICS.....	1
CHAPTER 1 Introduction and Overview.....	3
Chapter Overview	3
Rules to Live By.....	4
Who Should Read This Book?.....	5
How Is Material Presented in This Book?.....	6
What Will You Learn, and How Will It Help Your Career?.....	6
What Is in This Book?	8
Part I: the basics	8
Part II: how things work.....	9
Part III: The things that make systems sing	12
Chapter Summary	15
CHAPTER 2 Foundational Security and Access Control Concepts.....	21
Chapter Overview	21
Understanding Risk	22
Types of organization assets	22
Types of users.....	23
Types of threat actors	24
Understanding criticalities and consequences.....	26
Understanding vulnerability	27
Understanding probability	27
What is risk?	28
Managing Risk.....	28
Methods of managing risk.....	28
How security and access control programs help manage risk.....	29
Security program elements.....	29
The importance of a qualified risk analysis.....	30
The importance of security policies and procedures	30
Types of Countermeasures	31
Hi-tech	31
Lo-tech	32
No-tech.....	32
Mixing approaches	33
Layering security countermeasures	33
Access Control System Concepts.....	34
Types of users.....	37
Types of areas/groups.....	37
User schedules	37

Portal programming	38
Credential programming.....	38
Group and schedule programming	38
Chapter Summary	38
CHAPTER 3 How Electronic Access Control Systems Work.....	43
Chapter Overview	43
First, a Little History	44
The Basics.....	45
Authorized Users, User Groups, Access Zones, Schedules, and Access Groups	46
Authorized users	46
User groups	46
Access zones	46
Schedules	47
Access groups	47
Portals	47
Types of portals	48
Credential readers.....	49
Electrified locks.....	49
Safety systems	49
Alarm monitoring	50
Request-to-exit sensors.....	51
Credentials and Credential Readers	51
Credential Authorization	52
Locks, Alarms, and Exit Devices.....	52
Electrified locks.....	52
Alarms.....	54
Exit Devices.....	54
Data, Data Retention, and Reports.....	55
Chapter Summary	56
PART II HOW THINGS WORK	59
CHAPTER 4 Access Control Credentials and Credential Readers	61
Chapter Overview	61
Access Credentialing Concepts	62
Keypads.....	63
Access Cards, Key Fobs, and Card Readers.....	64
Wiegand Wire Cards	66
125 K Passive Proximity Cards.....	68
125 KHz (Low Frequency) Active Proximity Cards.....	68

13.56 MHz (High Frequency) Contactless Smart Cards	68
RFID Wireless Transmitter Systems.....	69
Multitechnology Cards	69
Mobile Phone Access Control.....	70
Capture Card Reader	70
Multitechnology Card Readers.....	70
Biometric Readers	70
Photo Identification	73
Chapter Summary	74
CHAPTER 5 Types of Access Controlled Portals.....	77
Chapter Overview	77
Portal Passage Concepts	78
Card entry/free exit.....	78
Card entry/card exit	78
Tailgate detection	78
Positive access control.....	80
2-Man rule	80
Schedules	81
Antipassback	81
Pedestrian Portal Types	82
Standard doors	82
Automatic doors	83
Revolving doors.....	85
Turnstiles	87
Man-traps	88
Automated walls	89
Vehicle Portals.....	89
Standard barrier gates	89
Automated vehicle swing gates.....	91
Automated sliding vehicle gates	91
Automated roll-up vehicle gates	92
High-security barrier gates	92
Sally ports	94
Chapter Summary	94
CHAPTER 6 Life Safety and Exit Devices	99
Chapter Overview	99
Life Safety First	99
Security Versus Life Safety	101
Understanding National and Local Access Control Codes and Standards.....	101
NFPA 101	101

International building code	101
NFPA 72	102
More on these codes	102
UL 294	103
Life Safety and Locks	104
Life Safety and Exit Devices	107
Life Safety and Fire Alarm System Interfaces	109
Chapter Summary	111
CHAPTER 7 Door Types and Door Frames.....	115
Chapter Overview	115
Basics About Doors and Security	115
Standard Single-Leaf and Double-Leaf Swinging Doors	117
Hollow metal doors	117
Solid core wood doors	118
Framed glass doors	119
Unframed glass doors	120
Total doors	121
Pivoting doors	123
Balanced doors	124
Door Frames and Mountings	125
Hollow metal—high-use and high-impact	125
Aluminum—medium-use and medium-impact	125
Wood—light-use and light-impact	126
Door mounting methods	126
Overhead Doors	126
Roll-up doors	126
Paneled overhead doors	126
Revolving Doors	126
Sliding Panel Doors	127
Bifold and Fourfold Doors	127
Chapter Summary	128
CHAPTER 8 Doors and Fire Ratings.....	131
Chapter Overview	131
What Are Fire Ratings?	132
Basic fire egress concept	132
How should this be done?	132
Exceptions	132
Fire Penetration Ratings	133
Hose stream test	134
Door Assembly Ratings	135
The three-fourths rule	135
Doors with glass	135

Temperature rise doors	135
Louvers	135
Fire Door Frames and Hardware.....	136
Latching devices	136
Fire exit hardware	136
Pairs of Doors	137
Latching hardware	137
Inactive leaf on pair of doors	137
Double egress pairs.....	137
Astragals	138
Smoke and draft control	138
“Path of Egress” Doors	138
Electrified Locks and Fire Ratings	139
Additional References	140
Chapter Summary	140
CHAPTER 9 Electrified Locks—Overview.....	145
Chapter Overview	145
Why Electric Locks?	146
Types of Electrified Locks	148
How Electrified Locks Work	149
Electric strikes	150
Electrified mortise locks.....	151
Electrified panic hardware	152
Electrified cylinder locks	153
Magnetic locks.....	153
Electrified dead-bolts.....	154
Paddle-operated electromechanical dead-bolts	155
Lock Power Supplies	156
Electrified Lock Wiring Considerations	157
Voltage drop example	159
Electrified Lock Controls	159
Types of Locks Not Recommended.....	161
Chapter Summary	164
CHAPTER 10 Free Egress Electrified Locks.....	169
Chapter Overview	169
Types of Free Egress Locks	170
Electrified Mortise Locks.....	170
Mortise latch only—no lock.....	171
Mortise locks with no dead-bolt.....	171
Mortise locks with dead-bolts	172
Door frame considerations	174

Additional lock switch fittings	175
Door handing	175
Electrified "Panic" Hardware	176
Rim exit devices	176
Mortise lock exit devices	177
Surface-mounted vertical rod exit devices.....	177
Concealed vertical rod exit devices	178
Three-point latching exit device	179
Exit device functions	179
Electrical options	179
Popular double door applications.....	181
Electric Strikes.....	181
Switches available for electric strikes.....	184
Electrified Cylinder Locks	184
Self-Contained Access Control Locks	185
Chapter Summary	185
CHAPTER 11 Magnetic Locks	189
Chapter Overview	189
Standard Magnetic Locks	189
Standard magnetic lock applications.....	191
Magnetic Shear Locks	191
Magnetic shear lock applications.....	193
Magnetic Gate Locks.....	193
Cautions About Magnetic Locks	194
Egress assurance	195
Operational and maintenance warnings	196
Chapter Summary	198
CHAPTER 12 Electrified Dead-Bolt Locks	201
Chapter Overview	201
Surface-Mounted Electrified Dead-Bolt Locks	201
Concealed Direct-Throw Mortise Dead-Bolt Lock	202
Dead-Bolt Equipped Electrified Mortise Lock.....	203
Top-Latch Release Bolt.....	204
Electrified Dead-Bolt Gate Locks	205
Electrified dead-bolt lock safety provisions	205
Chapter Summary	206
CHAPTER 13 Specialty Electrified Locks.....	209
Chapter Overview	209
Electrified Dead-Bolt-Equipped Panic Hardware.....	210
Securitech Locks.....	210

Delayed Egress Locks	211
Specialize school locks to protect against active shooters	212
Hi-Tower Locks.....	212
CRL-Blumcraft Panic Hardware	214
Chapter Summary	214
CHAPTER 14 Selecting the Right Lockset for a Door.....	217
Chapter Overview	217
Standard Application Rules	217
How to Select the Right Lock for Any Door	218
Description of door.....	218
Framed glass door.....	221
Herculite lobby doors	222
High-rise building stair-tower door.....	223
Rear-exit door on warehouse with hi-value equipment.....	225
Office suite door	226
Double-egress doors—hospital corridor	228
Inswingng office door	229
Revolving door—emergency egress side door	231
Chapter Summary	232
CHAPTER 15 Specialized Portal Control Devices and Applications	237
Chapter Overview	237
Specialized Portals for Pedestrians	238
Automatic doors	238
Man-traps	239
Full-verification portals	241
Electronic turnstiles	242
Antitailgate alarm	245
Specialized Portals for Vehicles.....	246
High-security barrier gates	246
Sally ports	247
Chapter Summary	250
CHAPTER 16 Industry History That can Predict the Future.....	255
Chapter Overview	255
A Little Background	256
First Generation	257
Second Generation.....	259
Third Generation.....	260
Fourth Generation	261
Stalled progress.....	263
Fifth Generation.....	265

Avoiding Obsolescence	267
Planned obsolescence	267
Unplanned obsolescence.....	267
What the future holds	268
Chapter Summary	269
 CHAPTER 17 Access Control Panels and Networks 273	
Chapter Overview	273
Access Control Panel Attributes and Components	273
Communications Board	276
Power supply and battery	277
Central processing unit.....	277
Erasable programmable read-only memory	278
Random access memory	278
Input/output interfaces	278
Access Control Panel Form Factors.....	279
Access Control Panel Functions.....	282
Access Control Panel Locations.....	284
Local and Network Cabling	286
Networking Options.....	289
Redundancy and Reliability Factors	291
Good wiring and installation	292
Good design	292
Good power	292
Good data infrastructure	293
Redundancy	294
Chapter Summary	294
 CHAPTER 18 Access Control System Servers and Workstations..... 299	
Chapter Overview	299
Server/Workstation Functions	300
Store system configurations	300
Store the system's historical event data.....	301
Manage communications throughout the entire system	303
Serve workstations with real-time data and reports	304
Decision Processes.....	305
System Scalability	306
Unscalable Systems	306
Basic scalability	307
Multisite systems	307
System-wide card compatibility.....	307
Enterprise-wide system.....	308
Master host.....	308
Super-host/subhost.....	308

Access Control System Networking	309
The core network.....	309
The server network.....	310
The workstation network.....	310
The access control panel network	311
Integrated security system interfaces	311
VLANs.....	312
Multisite network interfaces.....	312
Integration to the business information technology network	312
Legacy Access Control Systems	313
Chapter Summary	314

PART III THE THINGS THAT MAKE SYSTEMS SING.....321

CHAPTER 19 Security System Integration323

Chapter Overview	323
Why Security Systems Should Be Integrated.....	323
Integration Concepts.....	326
Benefits of System Integration.....	328
Operational benefits.....	328
Cost benefits	331
Types of Integration	331
Dry contact integration	332
Wet contact integration	332
Serial Data Integration.....	334
TCP/IP Integration.....	334
Database Integration	334
System Integration Examples	334
Basic system integration.....	335
More advanced system integration.....	335
Advanced system integration	336
Chapter Summary	343

CHAPTER 20 Integrated Alarm System Devices347

Chapter Overview	347
Alarm Concepts	347
Detection and initiation	347
Filtering and alarm states	348
Communication and annunciation.....	350
Assessment.....	351

Response	353
Evidence.....	353
Types of Alarm Sensors	354
Outer perimeter detection systems	354
Building perimeter detection systems	359
Interior volumetric sensors	361
Interior point detection systems	362
Intelligent video analytics sensors	367
Complex alarm sensing	368
Beyond Alarm Detection.....	369
Trend analysis.....	369
Vulnerability analysis	369
Alarm analysis	369
Chapter Summary	370
CHAPTER 21 Related Security Systems	375
Chapter Overview.....	375
Photo ID Systems	375
Visitor Management Systems.....	376
Security Video	377
Video history you need to know	377
Cameras and lenses	379
Lighting and light sources	380
Auto-white balance.....	382
Dynamic range	382
Display devices.....	382
Video recording devices	382
Video motion detectors	386
Video analytics	387
Video system interfaces.....	387
Security Communications.....	388
Two-way radio.....	389
Telephones	389
Security intercoms and bullhorns.....	390
Public address systems	391
Nextel phones	391
Voice loggers	392
Smart phones and tablets.....	392
Consolidated communication systems	392
Security Architecture Models for Campuses and Remote Sites	393
Command, Control, and Communications Consoles	394
Chapter Summary	395

CHAPTER 22	The Merging of Physical and IT Security	401
Chapter Overview	401	
There Is Only One Security Mission	402	
IT Security and Physical Security Share the Same Mission	402	
What Vulnerabilities Exist Between IT & Physical Security?.....	404	
Sophisticated Threat Actors Are Exploiting Those Vulnerabilities	406	
Learn How to Reduce and Mitigate Those Vulnerabilities.....	407	
Chapter 21A—Chapter Summary	408	
Chapter 21A Summary—The Merging of Physical and IT Security ...	409	
CHAPTER 23	Securing the Security System.....	413
Chapter Overview	413	
Understand That the Organization Isn't Secure If the Security System Isn't Secure	414	
What Kinds of Threats Present a Problem to Securing the System Data?	414	
What Kinds of Vulnerabilities Can Exist in the Security System Itself?	415	
What Can We Do To Secure the Security System?.....	416	
A 9 Point Plan for Securing the Security System	417	
Chapter Summary	420	
Chapter 21B—Chapter Summary	421	
CHAPTER 24	Related Building/Facility Systems and REAPS Systems.....	425
Chapter Overview	425	
Building/Facility Systems.....	425	
Elevators	426	
Stairwell pressurization	427	
Lighting.....	428	
Controlling and Automating Building Functions	429	
Direct action interfaces.....	429	
Proxy action interfaces	429	
Feedback interfaces	429	
REAPS Systems.....	430	
Irrigation systems	430	
Deluge fire sprinkler control	431	
Acoustic weapons	431	
High-voltage weaponry	433	
Remotely operated weaponry	433	
Appropriateness	434	
Operationally	434	
Safety systems	435	
Chapter Summary	436	

CHAPTER 25 Cabling Considerations.....	441
Chapter Overview.....	441
Cable Types	441
Copper/fiber	442
Cable voltage and power classes.....	442
Wire gauge.....	443
Insulation types.....	443
Stranded versus solid core wires.....	444
Cable colors	444
Cable brands	445
Conduit or No Conduit.....	446
Why use conduit?	446
Types of conduit.....	446
Other wireways.....	448
Indoor conduit applications	448
Outdoor conduit applications	448
When you can forget about conduit.....	448
Conduit fill.....	449
Conduit bends	451
Conduit/cable fire protection.....	451
Cable Handling	451
Cable handling nightmares	451
Cable handling and system troubleshooting	451
Cable Dressing Practices	452
What is cable dressing?	452
Cable dressing nightmares.....	452
Cable dressing and system troubleshooting	452
The proper way to dress cables.....	453
Cable cross-dressing	454
Cable Documentation	455
What is cable documentation?	455
Who cares about cable documentation?.....	455
When should cable documentation begin?	456
What is the best way to document cabling?	456
What is the best way to present cable documentation?.....	456
Chapter Summary	457
CHAPTER 26 Environmental Considerations	463
Chapter Overview.....	463
Electronic Circuitry Sensitivities	463
Environmental Factors in System Failures	464
Temperature extremes	464
Humidity or condensation	465

Vibrations.....	466
Dirt	466
Insects, birds, snakes, and other creatures	467
Lighting (at access control system portals)	467
Securing the IP network	468
Access control in the cloud	469
Security-Systems As-A-Service	470
Chapter Summary	470
CHAPTER 27 Access Control Design.....	473
Chapter Overview	473
Design Versus Installation Versus Maintenance	
(The Knowledge Gap)	474
The Importance of Designing to Risk	474
The Importance of Designing for the Future	475
Design Elements	476
Drawings	476
Specifications	477
Interdiscipline coordination	478
Product selection.....	479
Project management	479
Client management.....	480
Designing Robust Portals—How Criminals Defeat	
Common Locks, Doors, and Frames	481
Unlocking the door from the outside	482
Double glass door exploit.....	482
Defeating electrified panic hardware	483
Defeating door frames	484
Application Concepts	484
Robust design.....	485
Redundancy	486
Expandable and flexible	486
Easy to use	486
Sustainable	487
Implementing Design Ideas to Paper	488
Creating access control zones	488
Door types.....	488
Alarm devices	490
Racks, consoles, and panels	490
Conduits and boxes.....	490
Physical details	492
Riser diagrams	493
Single-line diagrams	493

Wiring diagrams	494
Schedules	495
System Installation	495
Project planning	495
Project schedule	496
Shop and field drawings	497
Product acquisition	497
Permits	498
Coordination with other trades	498
Access coordination	498
Preliminary checks and testing	499
Final works	499
System Commissioning	499
Completing Punch List Items	500
System Acceptance	500
Chapter Summary	501
CHAPTER 28 Access Control System Installation and Commissioning	509
Chapter Overview	509
Jobsite Considerations	510
Conduit Versus Open Cabling	511
Device Installation Considerations	511
The Importance of Documentation	512
Device Setup and Initial Testing	513
Alarm and Reader Device Database Setup	513
User Access Database Setup	513
Access Schedules and Areas	514
Chapter Summary	515
CHAPTER 29 System Management, Maintenance, and Repair	519
Chapter Overview	519
Management	519
Governance, Risk Management and Compliance	520
Database management	520
Merging databases of different systems on a common corporate campus	521
Alarm management	522
Reports	522
Maintenance and Repair	522
System as-built drawings	522
Wire run sheets	524
System infant mortality	524
Maintenance versus repairs	525

Scheduled maintenance	525
Emergency repairs	525
Maintenance contracting options	526
Security System Integrity Monitoring.....	528
Chapter Summary	532
Index	537