T-M

TRANSPORTATION-MARKINGS

GENERAL TABLE OF CONTENTS

WITH INDEX

Brian Clearman
Mount Angel Abbey
7th Edition, 2010

With
GENERAL PREFACE
For T-M
Monograph Series
Transportation-Markings

General Table of Contents

With Index
TRANSPORTATION-MARKINGS A STUDY IN COMMUNICATION MONOGRAPH SERIES

Alternate Series Title: An Inter-modal Study of Safety Aids

Alternate T-M Titles: Transport [ation] Mark [ing]s/Transport Marks/Waymarks


_International Railway Signals_, 1991 (Part F, Vol II)


Transportation-Markings Database:
- Aero, 2nd ed, 2009 (Part Iv) (1st ed, 2001)
- Composite Categories Classification & Index, 1st ed, 2006 (Part Iv, Vol III) (2nd ed, Projected)


Transportation Markings as an Information/Communication System (Part K, Vol IV, Projected)

T-M

TRANSPORTATION-MARKINGS

GENERAL TABLE OF CONTENTS

WITH INDEX

Brian Clearman

Mount Angel Abbey

7th Edition

2010
Copyright (c) Mount Angel Abbey

1993, 1994, 1997,
1998, 2000, 2001,
2002, 2003, 2004,
2008, 2010
GENERAL PREFACE FOR

TRANSPORTATION-MARKINGS

MONOGRAPH SERIES

2010
GENERAL PREFACE FOR TRANSPORTATION-MARKINGS
MONOGRAPH SERIES

The T-M process outlined in these studies describes and classifies safety aids that assist operators of modes of transportation; that process also includes technical and historical perspectives. However, a simple describing and classifying of safety aids can obscure what is at the core of T-M: T-M is essentially a study of symbolic behavior (see Note No. 1). Symbols and what they mean permeate the seemingly practical subject matter of T-M.

T-M weaves in and out of many disciplines and perspectives. Among established disciplines that of semiotics (see Note No. 2A) may come closest to explaining the workings of T-M. Communication, design, culture (in particular, material culture), and holarchy also participate in that explanation. Engineering and technology physically undergird T-M.

T-M studies extends over a quarter-century with early classification studies spanning nearly four decades. The order of the studies has been affected by specific topics and by chronology. A more logical and integrated outline of the studies would be at variance with the historical development and listing of monographs. Such an outline can be suggested by a tripartite formulation:

Integrative Studies (General Table of Contents; Foundations; General Classification; T-M History; T-M as Information/Communication System [projected].
Modal Studies (Marine Aids to Navigation; Traffic Control Devices; Railway Signals; Aero Navaids; US T-M [an inter-modal and adjunct study].
Database (Marine; Road; Rail; Aero; Composite Classification/Index).

Introductive and integrative material for T-M can be found in a variety of places in the monographs. One such place is in the Prolegomena in Part A, Foundations (Addenda, Segments i and ii) which offers both a starting point and a summary of that material.
Note No. 1: T-M Defined

The original T-M definition referred to individual devices: “T-M is any device that aids a mode of transportation by giving information, providing regulations, or expressing warnings.”

In an essay for Proceedings (Charted Institute of Transport, UK, June 1997) that earlier device-focussed definition was prefaced by this statement: “Transportation-Markings is an integrative and wholistic study of all forms of safety aids in the realm of Transport.”

This General Preface offers a further correction by specifying the nature of that study: T-M is a study of symbolic behavior. The apparatus for producing symbols, the resulting symbols and their meaning are at the heart of that study.

The term Safety Aids can constitute an alternate term for T-M. Yet it is a very elastic term that can prove elusive as an internet search will quickly confirm. It remains an important term when placed in a transportation context and external to modes of transportation. Other possible alternate terms include Transport [ation] Marks [ing]s and Waymarks. An added source for information on terminology relating to T-M studies is to be found in the Appendix of T-M Foundations (Part A, 5th edition, 2008).

Note No. 2A Semiotics & T-M

P. Guiraud, C. Morris, T. Sebeok are important sources for semiotics in these studies. D. Sless, S. Hervey, A. Berger, W. Leeds-Hurwitz, W. Noth are other influences. However, what may be the most significant source was unknown to T-M until relatively recently: Signs, Symbols, and Ciphers (ET 1998) by Georges Jean, a professor of semiology and linguistics at the University of Maine (France). Jean surveys signs and symbols of many forms in his book. His descriptive treatment includes both physical apparatus and messages. His formal semiotics is reserved to an anthological survey of Sign Theory. His chapter on
“Road Signs” (Signes de Pistes in French; see Note No. 2B) includes visual, sound and electronic devices across the range of transportation modes. Quite possibly no other semiotic source comes close to his coverage. And the T-M studies bear more resemblance to Jean than any other source. Jean’s book is within the subject heading of Signs and Symbols but it is classified as Semiotics. There are seemingly few mentions of Jean in semiotic literature. Nonetheless, his work can be viewed as semiology (or semiotics). And it provides a valid approach to that subject; and an approach that can encompass T-M.

Note No. 2B Road Signs/Signes de Pistes

Road Signs may be a literal translation of Signes de Pistes but it is inadequate for the full range of subject matter of Chapter 5. G. Jean may possibly have sought a term that could encompass all forms of safety aids for transportation. His choice, Signes de Pistes, is admittedly a problem in translation. Internet searches often result in a translation of “Sign of Track” which is employed in diverse ways. That translation may not be fully adequate yet it provides a clue. A further clue to its meaning is found in the “KudoZ network” (within the ProZ.com website devoted to translation assistance). One contributor states that Signe de piste “is derived from a mark on the ground or on a tree when scouts play a big outdoor game in a forest or natural area. In English we would say something like trail blazing signs or trail signs. A ‘signe de piste’ is an indication meaning ‘go’ or ‘stop’ or ‘left’ or ‘right’ or ‘look for a hidden message’ etc.”

Speculation suggests that Jean wanted an encompassing term and signes de pistes with its meaning of tracks, trails and messages of directions was his choice for that term. Perhaps it is less than fully adequate (or more likely, a new and expanded use of the term may not immediately achieve a fully understood significance) yet it has more value than a specific term such as road sign. Signe de piste in the French language may have a role similar to that of Transportation-Markings in the English language. Both terms struggle to encompass a broad range of activity lacking an established term.
TRANSPORTATION-MARKINGS GENERAL TABLE OF CONTENTS

TRANSPORTATION-MARKING FOUNDATIONS

PROLEGOMENA

Prolegomena: The Original Revisited
a) T-M Studies 10
b) T-M: A Discipline? 16
c) T-M: Why Not a Discipline Before Now? 18
d) T-M: Approaches & Forms 20
e) Underpinings for T-M 21

Prolegomena: Addenda
i  T-M in Proceedings 23
ii  Building Construction: An Analogy for T-M Studies 29
iii Practical Symbol Practitioners 31
iv “Final Edition” 34
v The Semiotics Circus Tent 35

CHAPTER ONE
THE STUDY OF T-M IN A MULTI-FACETED FRAMEWORK:
SEMIOTICS, COMMUNICATIONS, CLASSIFICATION & HOLARCHY

A  Semiotics & Communications
  1  Introduction to Chapter 1 38
  2  Basic Semiotic Concepts 40
  3  Foundation of Messages 43
  4  Communication Model 46
  5  Semiotics of the Object 47
CHAPTER TWO
LIGHT & COLOR PROCESSES & VISUAL T-M

A Primer on Light & Color
1 Light: A Brief Review 60
2 Introduction to Color 64
3 Light Sources 68

B Color & T-M
1 Historical Development of Color Use in T-M 71
2 Summary of Color Usage in T-M 75

C Historical Development of Color Messages
1 The Development of Messages Before 1900
   a) Before 1850 79
   b) 1850-1900 83

2 The Development of Messages Since 1900
   a) 1900-1925 88
   b) Developments Since 1925 92

CHAPTER THREE
ELECTROMAGNETIC PROCESSES & ELECTRONIC T-M

A Primer on Electromagnetic Processes
1 Electromagnetic Radiation & Waves 96
2 Electromagnetic Waves: Generation, Propagation & Reception 98
B Electronic T-M Forms: Signal Configurations & Receivers
   1 Introduction
   2 Electronic Signal Configurations & Receivers:
      Multiple-Station at One Location with Single Message
   3 Electronic Signal Configurations & Receivers:
      Multiple-Stations at One Location with Multiple-Messages
   4 Electronic Signal Configurations & Receivers:
      Single Station -- Single & Multiple Messages

CHAPTER FOUR
ACOUSTICAL PROCESSES & ACOUSTICAL T-M

A Primer on Acoustical Processes
   1 Introduction & Terminology
   2 Acoustical Processes
B Acoustical Signals Processes & Messages
   1 Types of Vibrating Instruments &
      Generating Sources
   2 Messages & Impediments

CHAPTER FIVE
TRANSPORTATION-MARKINGS & DESIGN

A Design, Culture & T-M
   1 Introduction
   2 Primer on Design
      a) Terminology
      b) Elements & Principles of Design
      c) T-M, Design & Culture
   3 Capsule History of Design: Victorian Era
      to the Present
      a) Introduction and the Victorian Era
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) Late 19th Century &amp; Earlier Twentieth Century</td>
<td>139</td>
</tr>
<tr>
<td>c) Design Since World War II</td>
<td></td>
</tr>
<tr>
<td>1) Introduction</td>
<td>141</td>
</tr>
<tr>
<td>2) Minimalism &amp; Functionalism</td>
<td>143</td>
</tr>
<tr>
<td>3) Cultural Icons</td>
<td>144</td>
</tr>
<tr>
<td>B External Factors Affecting T-M Design</td>
<td></td>
</tr>
<tr>
<td>1 Introduction for 5B &amp; 5C</td>
<td>149</td>
</tr>
<tr>
<td>2 The Historical Process</td>
<td>150</td>
</tr>
<tr>
<td>3 Science &amp; Technology’s Impact on T-M Materials &amp; Design</td>
<td>153</td>
</tr>
<tr>
<td>C T-M &amp; Design</td>
<td></td>
</tr>
<tr>
<td>1 Interaction of T-M &amp; Infrastructures with Design</td>
<td></td>
</tr>
<tr>
<td>a) The Impact of Transportation Routeway on the Design of T-M Forms</td>
<td>156</td>
</tr>
<tr>
<td>b) Influence on T-Ms Internal Requirements on Design</td>
<td>158</td>
</tr>
<tr>
<td>c) Summary of Factors Affecting the Creating of T-M Characteristics &amp; Design</td>
<td>161</td>
</tr>
<tr>
<td>2 T-M as a Reflection of Culture</td>
<td></td>
</tr>
<tr>
<td>a) Historical Backdrop</td>
<td>163</td>
</tr>
<tr>
<td>b) T-M: A Reflection of its Times</td>
<td>166</td>
</tr>
<tr>
<td>3 Message Systems &amp; Design: T-M as Communications</td>
<td></td>
</tr>
<tr>
<td>a) Introduction &amp; Terminology</td>
<td>170</td>
</tr>
<tr>
<td>b) Graphic, Geometric &amp; Alphanumeric Symbols Design</td>
<td>172</td>
</tr>
<tr>
<td>c) Visual, Acoustical &amp; Electronic Message Configurations</td>
<td>173</td>
</tr>
</tbody>
</table>

APPENDIX: TERMINOLOGY FOUNDATIONS OF TRANSPORTATION-MARKINGS

i) Core Terms and Meanings

l) Introduction

a) Prefatory Statement                                                | 177  |
b) Uses of T-M and Perspectives on Transportation 178

2) Sources Employing Mark, Marker, Marking
   a) Mark/Marker/Marking 180
   b) Variant Forms 182
   c) LCSH 183

3) Other Terms
   a) Beacon, Signal, Sign: Other Primary Terms 184
   b) Terms That Compete With Transportation-Markings 185
   c) Overarching Terms Employed 1969-1975 187

ii) The Use of Mark/Marker/Marking in T-M
   a) Marine Aids to Navigation 189
   b) Aeronautical Navigation Aids 194
   c) Railroad Signals & Other Devices 205
   d) Traffic Control Devices 207

iii) Statistical Summary of Use of Mark/Marker/Marking in Transportation-Markings
     Monograph Series 216

BIBLIOGRAPHY 218

INDEXES

   General 239
   Names
         i Individual Names 245
         ii Group, Political & Geographical Names 249

13
FIRST STUDY IN T-M: THE UNITED STATES

PREFACE v
ACKNOWLEDGEMENTS vi

CHAPTER ONE [Formerly Chapter 7]
US TRANSPORTATION-MARKINGS: PRELIMINARY CONSIDERATIONS

A Taxonomy & Semiotics
1 Introduction: US Transportation-Markings: Model for Further Studies: The Role of Classification 1
2 Communication, Semiotics & the Physical Object 3

B A Celebration of Classifications
1 Forms of Classification in this Study 7
2 Messages & Phenomena 11
3 Nomenclature 17

CHAPTER TWO [Formerly Chapter 8]
CLASSIFICATION

A Main Classification
1 Outline Form: Markings Within a Context of Transportation-Markings 23
2 Explanatory Notes 32

B Variant Classification
1 Schematic Classification 39
2 Pictorial Classification 44
3 Explanatory Notes for Schematic & Pictorial Classifications 51

14
CHAPTER THREE [Formerly Chapter 9]
DESCRIPTIVE TREATMENT OF US TRANSPORTATION-MARKINGS: SEA & AIR MODES

A Marine Aids to Navigation
   1 Introduction & Fixed Aids 55
   2 Floating Aids 63
B Aeronautical Navigation Aids
   1 Introduction 67
   2 Lighted Navigation Aids 68
   3 Signs & Pavement & Elevated Markings 76
   4 Electronic Navigation Aids 80

CHAPTER FOUR [Formerly Chapter 10]
DESCRIPTIVE TREATMENT OF US TRANSPORTATION-MARKINGS: SURFACE MODES

A Traffic Control Devices
   1 Introduction & Traffic Control Signals 85
   2 Signs, Markings & Related Devices 90
B Railway Signals, Signs & Indicators
   1 Introduction & Lighted/Partially-lighted Signals 98
      Note 102
   2 Signs & Unlighted Signals 105

APPENDIX
CLASSIFICATION EXPANSION & EXPLICATIONS

i a) Multiple & Variant Classification 107
   b) Explanatory Notes 119
ii Double Transition Classification

15
a) Markings Within Forms of Energy  127
b) Markings Within Marking Forms  134
c) Explanatory Notes  140
d) Special Note  146

iii Classification of Messages: Signs & Markings
   a) Road  149
   b) Aero, Railway & Marine  165
c) Explanatory Notes  173

BIBLIOGRAPHY  177

INDEXES

General Index  185
Index of Marking Phenomena  187
INTERNATIONAL MARINE AIDS TO NAVIGATION

PREFACE vi

CHAPTER ONE [Formerly Chapter 11] 1
INTRODUCTION TO INTERNATIONAL MARINE AIDS TO NAVIGATION

CHAPTER TWO [Formerly Chapter 12] 9
HISTORICAL SURVEY OF BUOYS & BUOYAGE SYSTEMS

A Development of the Buoy & the Impact of Technology 11
1 The Impact of the Industrial Revolution on Buoys
2 The Buoy and Its Development in the Nineteenth Century

B The Development of International Buoyage Systems 14
1 International Buoyage Systems, 1846-1936
2 Red/Green to Port-Red/Green to Starboard: A Special Problem in International Buoyage 17

C IALA Buoyage System 30

CHAPTER THREE [Formerly 13] 35
CLASSIFICATION OF BUOYAGE IN INTERNATIONAL USAGE

A The Classification
B Notes on Classification of Buoys in International Usage 37
C Illustrated Classification 41

CHAPTER FOUR [Formerly Chapter 14] 17
DESCRIPTION OF BUOY TYPES
A Lighted & Lighted-Sound Buoys 51
B Unlighted Buoys
   1 Unlighted Buoys: Conical & Can/Cylindrical Buoys 52
   2 Unlighted Buoys: Spars, Standard and Miscellaneous Buoys 56
C Sound Buoys 62

CHAPTER FIVE [Formerly Chapter 15]
MESSAGE SYSTEMS FOR FLOATING AIDS TO NAVIGATION 69
A Uniform System of Buoyage 70
B IMC-Influenced Buoyage Systems 85
C IALA Buoyage System 91

CHAPTER SIX [Formerly Chapter 16]
INTRODUCTION TO VISUAL MARKINGS
A The Problem of Methodology With Analogic Discursive 101
B The Problem of Methodology: Towards a Solution 105

CHAPTER SEVEN [Formerly Chapter 17]
FIXED LIGHTED MARKINGS
A Determining the Division of Fixed Lighted Marine Transportation-Markings Into Major & Minor Categories 109
B Classification of Lighted Marine Markings & Explanatory Notes 112
C Descriptive Treatment of Structural Types 120
D Lighted Message System 126

CHAPTER EIGHT [Formerly Chapter 18]
UNLIGHTED VISUAL MARKINGS (DAYBEACONS)
INTERNATIONAL TRAFFIC CONTROL DEVICES

PREFACE

CHAPTER ONE
THE DEVELOPMENT OF TRAFFIC CONTROL DEVICES, 1903-1950

A European Traffic Signs
  1 Introduction 15
  2 European Traffic Signs, 1909-1926-1931 17
  3 The Old British System (OBS), 1903-1950 23
B Final League of Nations/Initial United Nations Traffic Signs System
  1 Introduction and League of Nations, 1938-1939 26
  2 United Nations Protocol, 1949 35
C Traffic Signs Developments in Africa/Middle East/Asia/Pacific/Americas, 1925-1950
  1 Early Africa/Middle East/Asia/Pacific/Americas
     a) The Americas 40
     b) Africa/Middle East/Asia/Pacific 40
  2 More Recent Africa: CASATC 46
D Traffic Signals & Traffic Markings to 1950
  1 Introduction 53
  2 Traffic Signals 53
  3 Traffic Markings 56

CHAPTER TWO
CLASSIFICATION WITH EXPLANATORY NOTES

A The Classification Revisited
  1 Introduction to Chapter 2 59
2 The Revisiting of the Classification
   a) The 4th Digit Problem: Aids Affected by it/Aids not Affected by it  60
   b) Classifying Principle: 4th-Digit May Represent Categories not Separate Aids  62
3 Changes in Classification Messages  64

B Classification & Notes
1 The Main Classification  66
2 Explanatory Notes  68
   General Note  74
3 Variant Classification for TCDs  75
   General Note  79

CHAPTER THREE
TRAFFIC SIGNALS WITH INTRODUCTION TO ENTITIES SPONSORING SIGNALS

A Introduction
1 Introduction to Chapter  80
2 The UN Draft Convention, 1952  81
3 The IAMM of TCDs  82
4 Code for TCD, ECAFE  85
5 Outgrowths of the 1952 Draft Convention  86
6 Changes and Reformation of Older Systems, 1950-1967
   a) Introduction & United Kingdom  87
   b) Scandinavia  89
   c) Canadian TCDs  89
   d) The United States  90
   e) The Threshold of 1968: Divergence & Unity  91

B Traffic Signals
1 Introduction & Traffic Signals Before 1968
   a) Introduction  93
   b) Terms  94
   c) Traffic Signals, 1952-1967  95
2 Traffic Signals: 1968 and After
   a) Documents Preceeding UN 1968 96
   b) 1968 UN Conference: Traffic Signal Message 98
   c) Changes After 1968: Europe and North America 100

CHAPTER FOUR
WARNING & INFORMATIVE SIGNS

A Warning Signs, 1952-1968
  1 Introduction 103
  2 1952-1967 104
  3 UN 1968 Danger Warning Signs 106
  4 Regional & National Changes & Implementation 111
B Informative Signs
  1 Introduction 114
  2 Informative Signs, 1952-1967 114
  3 UN 1968 & Informative Signs 116
      a) Changes in Drafts
      b) Signs in UN 1968 118
      c) Aftermath of UN 1968: Implementation & Changes 122

CHAPTER FIVE
REGULATORY SIGNS

A Regulatory Signs Before 1968
  1 Introduction 126
  2 Regulatory Signs, 1952-1967 127
B UN 1968 & Aftermath
  1 The Building of the UN System 131
  2 The Problem of the Red Oblique Bar 135
  3 Regulatory Signs at UN 1968 143
  4 Aftermath of UN 1968: Regulatory Signs 147
CHAPTER SIX
TRAFFIC MARKINGS

A Introduction & Traffic Markings Before 1968
  1 Introduction: Terms, Classification, Overview 153
  2 Traffic Markings, 1952-1967 155
B UN 1968: Traffic Markings
  1 Review of Drafts 158
  2 UN 1968 Provisions 159
  3 Aftermath of UN 1968 162

APPENDIX I

i Classification System Terms 168
ii Message Characteristics Terms 170
iii Marking Types Terms 172
iv Transportation Terms 174
v Political Terms 175

APPENDIX II
A COMPARATIVE REVIEW OF INTERNATIONAL ROAD SIGNS, 1909-1968

i Introduction 177
ii The Chart 182
iii Explanatory Notes 199
iv Sign Shapes and Color Formats 199
   a) Sign Shape Illustrations 200
   b) Sign Shapes 208
   c) Systems Use of Color 210

23
BIBLIOGRAPHY

i  Abbreviations for Sources  217
ii  Books, Journals & Reports (Non-Govermental Sources)  219
iii  UN Sources
   a) UN Conference on Road Traffic  221
   b) Other UN Sources  222
iv  Other Government Sources  223

INDEXES

General Index  227
Index of Names  231
Index of T-M Phenomena  237
INTERNATIONAL RAILWAY SIGNALS

PREFACE ix
ACKNOWLEDGEMENTS xi
ABBREVIATIONS vii

CHAPTER ONE [Formerly Chapter 28]
RAILWAY SIGNALLING; INTRODUCTION, HISTORY & METHODOLOGY

A Introduction, Physical Properties & Semiotics of the Signal 1
1 Introduction 1
2 Physical Properties 2
3 Semiotics of the Signal 6
B Aspects of the History of the Railway Signal 13
1 The Formative Period, 1830-1920 13
2 Further Developments, 1920-1980 20
C Methodology of the Monograph 25

CHAPTER TWO [Formerly Chapter 29]
CLASSIFICATION

A The Main Classification 33
1 Introduction 33
2 Classification of Signals 35
3 Explanatory Notes 38

B Variant Classification 47
1 Introduction 47
2 Shape Configuration of Signals 49
3 Illustrations 66
CHAPTER THREE [Formerly Chapter 30]  
COLOR & MEANINGS

A Toward Basic Principles in Signalling
   1 Meaning of Colors  93
   2 IUR Principles  96
   3 The URO System  98
   4 British Signal Practice  99
   5 North American Signal Practice  100
   6 European Signal Practices  103
   7 UAR Signal System  105

B Color Usage in Signals, Signs, Markings
   1 Basic Colors  109
   2 Signal Colors: Combinations  112
   3 Less-Used Colors  116
   4 Color Usage in Combination with Non-Color Symbols  118

CHAPTER FOUR [Formerly Chapter 31]  
ALL-LIGHTED SIGNALS & MESSAGES

A Types of Signals
   1 Color-Light Signals: Forms & Configurations  123
   2 Semaphoric Signals in All-lighted Forms: Position & Color-Position  128
   3 Cab Signals: Introduction & Types  131
   4 Graphic, Geometric & Alphanumeric Types  132

B Message for All-Lighted Signals
   1 Introduction & Basic Messages  135
   2 Complex Message Configurations  138
   3 Messages for Position-Light & Color-Position Signals  142
   4 Messages for Cab-Signals  146
CHAPTER FIVE [Formerly Chapter 32]
PARTIALLY-LIGHTED & UNLIGHTED SIGNALS, SIGNS,
MARKINGS & MESSAGES

A Semaphore Signals: Introduction
  1 Background, Terminology & Characteristics 151
  2 Models of the Semaphore: National, Regional, & Technical 154
B Messages for Semaphore Signals
  1 Fully-Integrated Semaphore Signals 159
  2 Partially & Non-Integrated Semaphore Models 162
C Signal Boards
  1 Terminology, Types & Locations 165
  2 Messages 168
D Graphic & Geometric Signals
  1 Terminology, Types of Signals & Functions 175
  2 Geometric Signals 177
  3 Graphic Signals 180
E Messages for Geometric & Graphic Signals
  1 Graphic Signals: Rotating & Revolving Discs & Panels 184
  2 Free-Standing Geometric Signals & Messages 186
F Non-Sign Markings
  1 Problems of Terminology for Markings & Signs 192
  2 Types & Messages for Non-Sign Markings 194
G Railway Signs
  1 Introduction & Types 198
  2 Messages for Signs 203

GLOSSARY OF TERMS 207

APPENDICES: 27
I  Staff, Tablets, Tickets & Tokens  214
II Major Railway Systems: Signal Types & Messages  221

BIBLIOGRAPHIES

I  Sign, Signal & Marking Sources  237
II  Other Materials  245

INDICES:

General  259
Sign, Signal & Marking  264
Names of Persons & Organizations  270
CHAPTER THREE [Formerly Chapter 35]

A Approach Lighting
   1 Introduction 85
   2 Equipment 87
   3 Messages 89
B Final Approach Lighting
   1 Introduction 92
   2 Messages 93
   3 Equipment 99
C Runway & Taxiway Lighting
   1 Background, Terminology & Function 101
   2 Inset Lights 102
   3 Elevated Lights 105
   4 Messages for Inset & Elevated Lights 107
D Beacons & Obstruction Lighting
   1 Introduction 112
   2 Beacons 113
   3 Obstruction Lights 115
   4 Messages for Beacons & Obstruction Lights 118

CHAPTER FOUR [Formerly Chapter 36]
PARTIALLY-LIGHTED & UNLIGHTED AERO NAVIGATION AIDS

A Signs & Markings
   1 Introduction to Chapter 4 121
   2 Signs: Types & Messages 123
   3 Markings: Types & Messages
B Indicators, Markers, Obstruction Markings & Restricted Use Markings
   1 Indicators: Types & Messages 129
   2 Markers: Types & Messages 130
   3 Obstruction Markings: Types & Messages 134
   4 Restricted Use Area Visual Aids 136
CHAPTER FIVE [Formerly Chapter 37]
AERO ELECTRONIC NAVIGATION AIDS

A  Fully Integrated Systems
   1  Chapter 5: Overview & Changes  139
   2  Instrument Landing Systems (ILS)  142
   3  Microwave Landing Systems (MLS)  145

B  Independent & Partially Integrated Aids
   1  VOR, TACAN, VORTAC & DME  148
   2  Beacons & Multi-mode Radio Aids  151

APPENDIX: COMPARATIVE REVIEW OF ICAO
AERO NAV AIDS, 1949-1991  159

BIBLIOGRAPHY  169

INDICES

i  General Index  191
ii  Index of Types of Aids and Systems  192
iii  Index of Names: Personal, Corporate & Organizational  193
TRANSPORTATION-MARKINGS GENERAL CLASSIFICATION

PREFACE WITH REFERENCES FOR QUOTES

CHAPTER 1
WITHIN TRANSPORTATION MODE CONTEXT (MARINE, AERO, ROAD, RAIL)

A Water & Air Transportation-Markings
1 Marine Aids to Navigation with Floating & Fixed Aids Submodes with Notes 17
2 Aero Navigation Aids & Note 20

B Surface Transportation-Markings
1 Traffic Control Devices & Note 23
2 Railway Signals, Signs, Markers & Notes 25

CHAPTER 2
INTERNATIONAL CLASSIFICATION BASED ON MESSAGE ENERGY FORMS

A Main Classification
1 Visual Forms--All-Lighted Forms 30
2 Visual Forms--Partially-Lighted Forms 31
3 Visual Forms--Unlighted Forms 33
4 Acoustic Forms 35
5 Electronic Forms 36
6 Note 38

B Alternate Classification 45
1 Schematic Classification 46
2 Alternate Classification: International Classification: Within Matrix of Nature of Messages 50

32
CHAPTER 3
VARIANT CLASSIFICATIONS

A Aids for Water & Air Transportation
   1 Marine Aids to Navigation Forms 56
   2 Aero Navigation Aids Forms 58
B Aids for Surface Transportation
   1 Traffic Control Devices 65
   2 Railway Signals, Signs, Markers 67
C Variant Taxonomy in a Different Key: Transportation-Markings in One Nation: The U.S. 76

Note 80

APPENDICES

I NOMENCLATURE
   i Main Classification
      a) Background 87
      b) Nomenclature 89
   ii Variant Classification 92
   iii Adjunct Classification 95

II INDEX OF CLASSIFICATION & NOMENCLATURE MATERIALS
   a) Main Classification 97
   b) Adjunct Classification 99
   c) Nomenclature & General Classification Methods 100

III TRANSPORTATION-MARKINGS PSALM
   I-VI Marine 102
VII-IX Aero 107
X-XII Rail 112
XIII-XVII Road 114

INDEXES
General 120
Names 121
Transportation-Marking Forms 124
T-M DATABASE: MARINE AIDS TO NAVIGATION

PREFACE 11
ACKNOWLEDGEMENTS 13

CHAPTER ONE FLOATING AIDS

A Indexes
  1 Categories 15
  2 Alphabetical 28

B Buoy Physical Forms
  1 Overarching Terms
    a) Basic Overarching Terms 42
    b) Other Overarching Terms 44
    c) Overarching Terms: Marine Aids to Navigation Mode 46
  2 Lighted Buoys 49
  3 Can & Cone Buoys 53
  4 Spar Buoys 56
  5 Barrel & Cask Buoys 57
  6 Single Forms of a Unitary Nature: Past & Present 58
  7 Sound Buoys 60
  8 Combination Buoys 64
  9 Other Buoy Physical Forms
    a) Materials of Construction Subforms 67
    b) Special Names Referring to Physical Structure 67
    c) Other Subforms 68

C Buoy Morphological Forms
  1 Location Forms 71
    a) Approach Buoys 71
    b) Channel Edge Buoys 72
    c) Channel Limits Buoys 72
  2 Message Forms 74
3 Hazard Buoys 75
4 Indirect Navigation Buoy Forms
   a) Station Buoys 77
   b) Towing Buoys 78
   c) Anchor, Anchorage & Moorage Buoys 78
5 Special Purpose Buoys 80
6 Miscellaneous Buoys 80
D Adjuncts Terms: Systems, Marks, & Special Classifications
   1 Systems 81
      a) General Terms 82
      b) Cardinal and Lateral Forms 83
      c) Older Systems: Red to Starboard Systems 84
      d) Other Older Systems 85
      e) League of Nations Forms 86
      f) IALA System Forms 86
   2 Marks 87
   3 Special Classification Forms 88
      a) Bodies of Water & Buoy Name 89
      b) Classes of Buoy Names 89
E Major Floating Aids
   1 Overarching Terms 91
   2 Lightships & Light Vessels 91
      a) General Comments 91
      b) Lightships & Light Vessels 92
      c) Human-related Terms: Operations of Lightships & Light Vessels 93
   3 Light Floats 94
   4 Large Navigation Buoy 94

CHAPTER TWO  FIXED LIGHTS

A Indexes
   1 Categories 97
   2 Alphabetical 106
B Overarching Terms 119
1 General Overarching Terms 119
2 Overarching Terms for Major Lights 119
3 Overarching Terms for Minor Lights 128

C Major Light Terms
1 Subdivisions 130
2 Individual Forms 134

D Minor Light Forms
1 Minor Lights-Single Forms 140
   a) Narrower Forms
   b) Wider Forms 143
2 Multiple-Member Forms 144
3 Other Forms: Enclosed/Composite/Single Structures 146

E Morphological & Adjunct Terms
1 Major Lights 149
2 Minor Lights 152
3 Character of Operation Forms
   a) Form of Operations 155
   b) Form of Nature of Light Operation 155
4 Miscellanea 157

F The Physical Light in the Form of Light Energy Emission
Configurations: Light Phase Characteristics 158
1 General Characteristics of Lights & Light Generating Apparatus 160
2 Specific Light Phase Characteristics
   a) Fixed Light/Fixed 162
   b) Fixed & Flashing Light/Fixed & Flashing 163
   c) Flashing/Flashlight Light 163
   d) Isophase Characteristics 166
   e) Occulting/Oculting Lights 167
   f) Quick, Very Quick, & Ultra Quick Characteristics
      I. Quick Section 168
      II. Very Quick Section 170
      III. Ultra Quick Section 171
   g) Alternating Forms 172
CHAPTER THREE DAYBEACONS

A Indexes
  1 Categories 173
  2 Alphabetical 178

B Overarching Terms & Special Topics
  1 Overarching Terms
    a) General Comments & Basic Terms 183
    b) Overarching Terms: Shared & Foreign Languages 186
  2 Special Topics: Topmarks & Daymark Forms
    a) General Comments 187
    b) Topmarks 188
    c) Daymarks 189
  3 Special Topics: Morphological Daybeacons
    a) Leading/Range Marks 191
    b) Signals 192
    c) Other Forms 192

C Physical Daybeacons
  1 Undimensional Daybeacons
    a) Established Names 194
    b) Local Name Group 197
  2 Structural Daybeacon Forms
    a) General Comments 201
    b) Structural Daybeacons Employing Parent Name 202
    c) Structural Daybeacons with Established Names 203
    d) Structural Daybeacons with Local/Descriptive Names 204
  3 Natural Marks 209

CHAPTER FOUR FOG SIGNALS

A Indexes
  1 Categories 212
  2 Alphabetical 219

B Fog Signal Types
  1 Overarching Terms 228
2 Diaphone Fog Signals 235
3 Diaphragm Horns
   a) Overarching Terms 236
   b) Diaphragm Signals - Compressed Air 237
   c) Diaphragm Fog Signals - Oscillator 239
4 Reeds 243
5 Sirens 245
6 Percussion Signals 250
   a) Bells 250
   b) Gong, Combination and Miscellaneous Forms 253
7 Whistles 254
8 Explosive Signals 257
9 Submarine Signals 261
10 Miscellaneous Signals 264

CHAPTER FIVE RADIO AIDS

A Indexes
   1 Categories 255
   2 Alphabetical 272
B Overarching Terms 281
C Radiobeacons
   1 Overarching Terms 284
   2 Radiobeacon Main Forms
      a) Directional Forms 286
      b) Non-Directional Forms 287
      c) Rotating Forms 288
      d) Composite Forms 288
   3 Other Forms of the Radiobeacons 288
   4 Character of Operation Forms 290
D Hyperbolic Forms
   1 Overarching Terms 291
   2 Decca Aids 292
   3 Loran Aids 294
   4 Hyperbolic Systems-Single & Near-Single Forms 298
5 Partially Hyperbolic Aids
   a) Consol 299
   b) Raydist Aids 300

E Radar, Satellite, Sound-Radio & Miscellaneous Aids
1 Radar Reflector Aids
   a) Overarching Terms & Corner Reflectors 302
   b) Radar Reflectors: Other Forms 303

2 Secondary & Primary Radar Forms
   a) Overarching & Primary Forms 304
   b) Shoran Forms 305
   c) Transponder Beacons 306

3 Satellite Navigation Aids
   a) Overarching & Other Terms 308
   b) Global Positioning Systems 309
   c) Navy Transit Satellite Navigation Systems 310
   d) Other Satellite Systems 311

4 Other Forms
   a) Sound/Radio Aids 313
   b) Miscellaneous Forms 314

BIBLIOGRAPHY
Books, Letters & Periodicals 315
Government Publications 320
Trade Literature 324
T-M DATABASE: TRAFFIC CONTROL DEVICES

PREFACE 9

CHAPTER ONE  INFORMATIVE SIGNS

A Indexes
1 Categories 11
2 Alphabetical 19
B Informative Signs
1 Introduction, Overarching Terms & Message Configurations 27
   a) Overarching & Sub-Overarching Terms
   b) Message Configurations 31
2 Destination & Distance Signs 34
3 Route Markers
   a) Introductory Note & Overarching Terms 39
   b) Specialized Route Marker Terms 40
   c) Route Marker Tabs 44
4 Mileposts 46
5 Signs Giving General Information (SGGI)
   a) Overarching Terms 49
   b) Service Sign 52
   c) Parking Signs 55
   d) Recreation Signs 56
   e) Other Signs 59

CHAPTER TWO  WARNING SIGNS

A Indexes
1 Categories 67
2 Alphabetical 75
B Warning Signs
1 Introductory Note, Message Configurations & Overarching Terms 41
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Introductory Note &amp; Overarching Terms</td>
<td>85</td>
</tr>
<tr>
<td>b)</td>
<td>Message Configurations</td>
<td>88</td>
</tr>
<tr>
<td>2</td>
<td>Roadway Alignment Signs</td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Introductory Note &amp; Overarching Terms</td>
<td>89</td>
</tr>
<tr>
<td>b)</td>
<td>Specific Terms</td>
<td>91</td>
</tr>
<tr>
<td>3</td>
<td>Roadway Condition Signs</td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Introductory Statements &amp; Overarching terms</td>
<td>94</td>
</tr>
<tr>
<td>b)</td>
<td>Specific Terms</td>
<td>95</td>
</tr>
<tr>
<td>4</td>
<td>Intersection Signs</td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Introductory Note, &amp; Overarching Terms</td>
<td>102</td>
</tr>
<tr>
<td>b)</td>
<td>Specific Terms</td>
<td>103</td>
</tr>
<tr>
<td>5</td>
<td>Intermittent Moving Hazards Signs</td>
<td>106</td>
</tr>
<tr>
<td>6</td>
<td>Construction &amp; Maintenance Signs</td>
<td>114</td>
</tr>
<tr>
<td>7</td>
<td>Other Hazards Signs</td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>General or Alternate Danger Signs</td>
<td>117</td>
</tr>
<tr>
<td>b)</td>
<td>Miscellaneous Forms</td>
<td>119</td>
</tr>
<tr>
<td>c)</td>
<td>Supplemental Plates/Plaques</td>
<td>123</td>
</tr>
</tbody>
</table>

CHAPTER THREE  REGULATORY SIGNS

A Indexes
1 Categories | 126
2 Alphabetical | 134

B Regulatory Signs
1 Introduction, Overarching/Sub-Overarching Terms & Messages | 145
   a) General Note | 145
   b) Overarching and Sub-Overarching Terms | 146
   c) Messages | 146
2 Priority Signs | 148
3 Prohibitory & Restrictive Signs | 151
   a) Prohibitory & Restrictive of Entry Sign | 152
      1) One-Way & Both Direction Forms | 153
      2) Exclusion Categories of Vehicles Forms | 154
      3) Vehicular Exclusion: Weight, Height & Length Forms | 155
4) Miscellaneous & Single Forms
b) Prohibitory & Restrictive: Turns & U-Turns Signs 156
c) Prohibitory & Restrictive: Overtaking (Passing) Signs 157
d) Prohibitory & Restrictive: Speed Limit Signs 158
e) Miscellaneous, Single Forms, & End of Prohibition or Restrictive Signs 160

4  Mandatory Signs 163
5  Standing & Parking Signs 172
6  Pedestrian Crossings Signs 178
7  Miscellaneous Regulatory Signs 181

CHAPTER FOUR TRAFFIC SIGNALS

A  Indexes
   1  Categories 183
   2  Alphabetical 187

B  Traffic Signals
   1  Traffic Control Signals
      a) Overarching Terms & General Note for Traffic Signals 191
      b) Specific Entries 195
c) Messages 195
d) Traffic Signals Operations 199
   2  Pedestrian Signals 200
   3  Traffic Signals-Other Forms 202
   4  Flashing Beacons
      a) Overarching Terms 206
      b) Specific Terms 207
   5  Lighting Devices 209
   6  Grade/Level Crossing Signals 211

CHAPTER FIVE TRAFFIC MARKINGS

A  Indexes
   1  Categories 214
2 Alphabetical

B Traffic Markings

1 Overarching & Sub-Overarching Terms with General Notes
   a) Overarching Terms with General Notes 229
   b) Sub-Overarching Terms
      1) Broader Terms 233
      2) More Restricted Forms 235

2 Pavement & Curb Markings
   a) Longitudinal Markings 236
      1) Center Line Markings 236
      2) Edge Lines 236
      3) Lane Markings 238
      4) Other Longitudinal Markings 240
   b) Transverse Markings 243
   c) Other Pavement & Curb Markings 245
   d) Physical Pavement Marking Forms 249
      1) Raised Pavement Markers 249
      2) Traffic Marking Physical Terms -
         Morphological/Physical 253
      3) Other Horizontal Markings 254

3 Hazard & Delineation Markings
   a) Hazard/Obstruction Markings 256
   b) Delineators 259
   c) Barricades & Channelizing Devices 260

APPENDIX I: COMPARATIVE SURVEY OF SIGNS

i Introduction 263
ii Traffic Signs Systems 263
iii Traffic Signs Approaches 265
iv Traffic Sign Categories 267
v The Chart 267
vi Overarching Terms for Traffic Signs 279

44
TRANSPORTATION-MARKINGS DATABASE:
RAILWAY SIGNALS, SIGNS, MARKS, MARKERS

PREFACE
ABBREVIATIONS

CHAPTER ONE
GENERAL RAILWAY SIGNAL TERMS

A Indexes
1 Categories
2 Alphabetical

B General Railway Signal Terms
1 Overarching Terms
  a) Signal Terms
  b) Fixed/Lineside/Railway-Railroad/Wayside Signal Terms
  c) Other Overarching Terms
2 Possibly/Partial Overarching Terms
  a) Energy & Technology-Related Terms
  b) Physical-Morphological Overlapping Terms
  c) Possible Overarching Terms-Miscellaneous
3 Primary Overarching Terms in Other Languages
4 Signal Components
5 Signal Confirmation

C Messages: Aspects & Indicators
1 Basic Terms & Colors
  a) Terms
  b) Colors
    1) Basic Colors
    2) Color Combinations

46
3) Specialized Colors 91
4) Spatial Configurations 92
5) Variant Color Combinations & Miscellaneous Color Uses 93

2 Aspects
a) Single-Aspect Terms 94
b) Two-Aspect Terms 94
c) Three-Aspect Terms 96
d) Four-Aspect Terms 97
e) Five-Aspect Terms 98
f) Other Aspects 98

3 Indications
a) Primary Forms 99
b) Specialized Forms 101

D Morphological Terms

General Note 105

1 Running Signal Terms
a) Overarching Signal Terms 106
b) Core Terms: Stop, Distant & Related Signal Terms
   1) Stop Signal Terms 108
   2) Starting Signal Terms 108
   3) Distant Signal Terms 110
c) System Terms 113
d) Route & Junction Signal/Indicator Terms
   1) Basic Terms 116
   2) Other Route & Junction Terms 117
e) Other Signal Terms Pertaining to Running Operations 119

2 Subsidiary Signal Terms
a) Overarching Terms 123
b) Switch Indicator/Signals & Points Indicators/Signals 124
c) Shunt Signal/Indicator Terms
   1) Overarching Shunting Terms 126
   2) Physical Shunting Terms 127
   3) Function-Related Shunting Signal Terms 128
d) Siding, Train Yard & Other Signals 131
3 Message-Related Signal Terms 131
4 Miscellaneous Signal Terms 133
E Systems (or Methods of Control)
1 Block Systems Terms
   a) Block System Overarching Terms 136
   b) Manual Block Signal Systems 139
   c) Controlled Manual Block Systems 139
   d) Automatic Block Systems 141
   e) Absolute/Permissive Systems 145
   f) Other Block Terms 149
2 Interlocking Terms 149
3 Train Control Terms
   a) Overarching Terms 154
   b) Forms of Train Control 158
   c) Subdivisions of Train Control
      1) Train Stop 159
      2) Speed Control 161
      3) Traffic Control 162
      4) CTC 162
   d) Specific Named Systems 163
   e) Miscellaneous Terms 169

CHAPTER TWO
ALL-LIGHTED SIGNALS

A Indexes
   1 Categories Index 172
   2 Alphabetical Index 180
B Overarching, Color Light, & Other All-Lighted Signal Forms
   1 Overarching Terms 190
   2 Color Light Signal Terms
a) Principal Forms
   1) Basic Forms
   2) Limited- Variant Forms
   3) Variant Forms
   4) Signalling Forms
b) Other Color Light Signal Forms
   1) Distance Forms
   2) Lens Arrangement Forms
   3) Morphology & Other Forms
3 Searchlight Signal Forms
4 Other All-Lighted Terms
   a) Single Lens Units [Frequently Morphological Dimension]
      1) Terms Slightly More Morphological Than Physical
      2) Somewhat More Morphological Than Physical
   b) Dwarf Signals [Frequently Multiple Lens]
   c) Undifferentiated Physical Forms
C Position Light, Color-Position Light & Symbolic Forms
   1 Position Light Signal Terms
   2 Color-Position Light Signal Terms
   3 Symbolic Forms
      a) Multi-Lamp Theatre Indicators
      b) Stencil Indicators
      c) Other Forms
D Cab Signalling
   1 Major Cab Signal Forms
   2 Forms (Operational) of Cab Signals
   3 Partly Morphological Terms
   4 Other Cab Signal Forms
   5 Cab Signal with Sound Dimensions

CHAPTER THREE
PARTIALLY-LIGHTED SIGNALS
A Indexes
1 Categories Index 230
2 Alphabetical Index 240

B Semaphore Signal Forms
1 Overarching Terms 250
2 Specific Forms
   a) Lower Quadrant & Upper Quadrant Signal Forms 252
   b) Somersault Signals 254
3 Methods of Operation 255
4 Morphology-Related Terms 258
5 System-Related Terms 260
6 Other Forms 261

C Signal Boards, Disc Signals & Other Forms
1 Signal Boards
   a) Overarching Terms & Terms in Other Languages 265
   b) Specific Board Terms 267
2 Disc Signals
   a) Disc Signals [Containing the Word Disc] 269
   b) Banner Signals [Exposed Disc Forms Under the Banner Name] 273
3 Morphological-Related Terms
   a) Switch Terms 276
   b) Point Indicators 276
   c) Route Indicators 276
   d) Other Forms 276
4 Other Forms
   a) Crossbar Signals 281
   b) Flag Signals 282
   c) Lighted Signs & Boards 283
   d) Track Indicators 283
   e) Other Forms 284
CHAPTER FOUR
UNLIGHTED, AUDIO & RADIO SIGNS, SIGNALS, MARKERS,
MOVABLE & TIME INTERVAL & TRAIN ORDER FORMS

A Indexes
   1 Categories  287
   2 Alphabetical  313

B Unlighted Fixed Forms with Constant Messages
   General Note  339
   1 Overarching Terms  339
   2 Location Signs  340
   3 Transportation Signs  341
      a) Speed Control & Restriction Signs  342
      b) Location Signs
         1) Advance Location Signs  347
         2) Limits & Location Signs  348
         3) Territory Limits Signs  348
   4 Maintenance of Way Signs  350
   5 Safety Signs  352
   6 Marks & Markers  353
   7 Boards & Posts  357
   8 Plates, & Flag Forms  366
   9 Other Forms With Constant Messages
      a) Blue Flag Forms  369
      b) Electric Traction Forms  370
      c) Miscellaneous Signs  370

10 Targets
   General Note  371
      a) Overarching Terms  371
      b) Morphological-Related Terms
         1) Shape  372
         2) Color & Position  374

51
3) Terms Related to Railroad Functions
   c) Other Terms
   d) Switch Stand Terms

C Acoustical & Radio Signals
   1 Acoustical Signal Terms
      a) Overaching Terms
      b) Explosive Signals
      c) Level Crossing/Grade Crossing Sound Signals
      d) Cab Signal & Train Control Sound Signals
      e) Other Forms

   2 Radio Signal Terms

D Staff, Ticket, Token, Tablet, Train Order & Time Interval Terms
   1 Staff Forms
   2 Staff & Ticket Forms
   3 Token Forms
   4 Tablet & Tablet & Token Forms
   5 Tokenless Forms
   6 Train Order Forms
   7 Time Interval Forms
   8 Other Forms

E Level/Grade Crossing Signs, Signals, Markers & Other Forms
   General Note
   1 Integrative Level Crossing & Grade Crossing Terms
   2 Lighted Level Crossing & Grade Crossing Signals
      a) Freestanding Signals
      b) Signals Attached to Other Devices

   3 Barriers & Gates
      General Note
      a) Overarching Terms
      b) Barriers, Full Barriers & Gates
         1) Automatic Barriers
         2) “Manned” & Manually Operated Barriers
      c) Half Barriers & Gates
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Sound Signals 428</td>
</tr>
<tr>
<td>5</td>
<td>Signs &amp; Boards 429</td>
</tr>
<tr>
<td>7</td>
<td>Other Forms 432</td>
</tr>
</tbody>
</table>

**BIBLIOGRAPHY**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Books, Journals, Letters, Reports 434</td>
</tr>
<tr>
<td>ii</td>
<td>Trade Literature 448</td>
</tr>
<tr>
<td>iii</td>
<td>Signal Code Materials 432</td>
</tr>
</tbody>
</table>

53
TRANSPORTATION-MARKINGS DATABASE: AERONAUTICAL NAVIGATION AIDS

PREFACE 11
ABBREVIATIONS 12

CHAPTER ONE AERONAUTICAL LIGHTED AIDS

A Indexes
   1 Catetegories Index 16
   2 Alphabetical 47

B Overarching Terms: General & Visual Terms
   1 General Terms for all Aeronautical Terms 76
      a) Primary Terms
      b) Specialized Terms 78
   2 Visual Aids Terms 82
   3 Sub-Overching Terms 88
   4 Overarching Terms for Lighted Aero Navigation Aids 86
      a) Light & Lighting Aids Terms
      b) Airfield & Airport Light/Lighting Terms 87
   5 Color & Other Messages 93
      a) Colors
         1) Single Colors
         2) Color Combinations 96
      b) Historic Uses 96
      c) Contemporary Usages 97

C Beacons & Obstruction Lighting
   1 Overarching Terms 100
   2 Physical Apparatus 102
      a) Method of Operation-Related Terms
      b) Dimension-Related Terms 103
c) Energy Source-Related Terms 106

3 Morphological Terms
   a) Airport Beacons
      1) Airfield & Airport Beacons 107
      2) Code Beacons 109
   b) Airway Beacons 111
   c) Heliport Beacons & Other Forms 113

4 Miscellaneous Forms & Support Structures
   a) Miscellaneous Forms 114
   b) Support Structures 115

5 Obstruction Lighting 116
   a) Overarching Terms 117
   b) Beacons 119
   c) Obstruction Lights-Incandescent & Miscellaneous Forms 121
   d) Obstruction Lights-Strobe & Composite Forms 122

D Approach Lighting
1 Overarching Terms 125
   a) Major Terms 125
   b) Secondary Terms 125
   c) Sub-Overarching Terms 126

2 Equipment Terms
   a) Approach Lighting Systems 128
   b) Physical/Morphological Terms 128
   c) Support Structure Terms 130

3 Approach Lighting Systems 131
   a) Approach Lighting Systems 131
   b) Special Approach Lighting Systems 137
   c) Historic Terms
      1) Slopeline Systems 140
      2) Center Line Systems 142
      3) Other Historic Forms 144

4 Final Approach Indicators 151
   a) Overarching Terms 151
b) Precision Approach Path Indicators

c) VASI Systems
   1) Forms
   2) VASIS: Types

d) Other Final Approach & Miscellaneous Forms
   1) Glide Path Forms
   2) Tri-Color Forms
   3) Fresnel Forms
   4) PILASI Forms
   5) Miscellaneous Forms

E Runway & Taxiway Lighting

1 Runway Lighting
   a) Overarching Terms
   b) Runway Edge Lights
   c) Runway Centerline Lights
   d) Threshold, Touchdown Zone, Runway End & Other Lights
   e) Runway Equipment Terms
      1) General Terms
      2) Physical Apparatus
      3) Terms by Intensity

2 Taxiway Lighting
   a) Overarching Terms
   b) Taxiway Edge Lighting
   c) Taxiway Centerline Lighting
   d) Physical Apparatus & Other Terms
      1) Physical Apparatus
      2) Other Terms

3 Historic & Composite Terms
   a) Historic Terms: Boundary, Contact & Range Lights
   b) Composite Terms
CHAPTER TWO SIGNS, MARKINGS, MARKERS & MARKS

A Indexes
   1 Categories Index 193
   2 Alphabetical Index 210

B Overarching Marks, Markers & Miscellaneous Terms
   1 Overarching Terms 226
   2 Marks & Markers
      a) Overarching & Physical Marker Forms 227
      b) Morphological Marker Forms 234
   3 Other Forms
      a) Reflective Aids 244
      b) Signal Panels, Signal Areas, Indicators, Other Objects & Miscellanev 247

C Signs & Markings
   1 Markings: Overarching, Runway & Taxiway Terms
      a) Overarching Terms 251
      b) Runway Markings 253
      c) Taxiway Markings 259
      d) Markings Other Than Overarching, Runway, Taxiway 262
      e) Special Categories
         1) Heliport & Vertiport Markings 269
         2) Holding Position Markings 276
         3) Obstruction Markings 278
         4) Apron Markings 280
   2 Signs
      a) Overarching Terms 281
      b) Sign Forms Other Than Runway & Taxiway Types 284
      c) Runway Signs 286
      d) Taxiway Signs 288
      e) Special Category: Holding Position Signs 289
      f) Sign Forms-Other 291
CHAPTER THREE RADIO AIDS

A Indexes
   1 Categories Index 293
   2 Alphabetic Index 315

B Radio Overarching Terms
   1 General Terms 336
   2 Sub-Overarching Radio Terms 341
   3 Special Terms 342

C Terminal Aids/Aids to Final Approach & Landing
   1 General Terms 346
   2 Historic Terms 348
       3 Instrument Landing Systems, ILS
           a) Principal Terms 357
           b) Other Terms 358
           c) Constituent Elements
               1) Component Terms 360
               2) Early Terms: Conway 2006 365
   4 Microwave Landing Systems, MLS
       a) Principal Terms 366
       b) Constituent & Other Terms 367
       c) MLS Systems & Constituent Terms: 1930s/1940s 369

D En-Route Aids
   1 Historic Terms
       a) Early Terms 371
       b) Intermediate Terms 373
   2 VOR, VORTAC, DME & TACAN Forms
       a) VOR, VHF Omnidirectional Radio Range 378
       b) Distance Measuring Equipment, DME 381
       c) TACAN/Tactical Air Navigation 382
       d) Composite Terms 383
   3 Hyperbolic Aids 385
       a) Overarching Terms 386

58
b) Loran 387
c) Decca 390
d) Consol 391
e) Omega 392
f) Miscellaneous Hyperbolic Aid Forms 393

4 Satellite Nav aids
   a) GPS 395
       1) Main Terms 396
       2) Specialized & Composite Terms 397
       3) NAVSTAR GPS 398
       4) GLONASS 399
   b) Augmentation Terms 400
       1) DGPS 400
       2) WAAS & LAAS Augmentation Terms 402
       3) Other Augmentation Terms 404
c) GNSS 405
d) Other Satellite Navigational Terms 406
       1) Satellite Navigation Terms 406
       2) Transit & US Navy System 409
       3) Miscellaneous Terms 410

E Intercategory Group: Beacons
   1 Nondirectional Beacons (NDB) 413
   2 Marks, Markers, Beacons 417
   3 Direction Finding Terms 423

BIBLIOGRAPHY

i Books, Reports & Internet Resources 428
ii Journals 432
iii Government Publications 438
iv Trade Literature 448
v Miscellaneity 450
T-M DATABASE: COMPOSITE CATEGORIES CLASSIFICATION & INDEX

PREFACE 23

CHAPTER ONE MARINE AIDS TO NAVIGATION

A Buoys & Other Floating Aids
   1 Physical Buoys
      a) Overarching Terms 24
         1) Basic Overarching Terms
         2) Other Overarching Terms
         3) General Overarching Terms for Marine Aids to
            Navigation
      b) Lighted Buoys 25
      c) Can & Conical Buoys 26
      d) Spar Buoys 26
         1) Basic Spar Buoys
         2) Specialized Spar Buoys
      e) Barrel & Cask Buoys 27
      f) Standard & Non-Standard Buoys 27
      g) Sound Buoys 27
         1) Overarching Terms
         2) Bell Buoys
         3) Whistle Buoys
         4) Siren Buoys
         5) Other Sound Buoys
      h) Combination Buoys 28
      i) Other Physical Buoy Terms 29
         1) Materials of Construction
         2) Special Names Referring to Physical Structure
         3) Other Specialized Terms

2 Buoy Morphology Terms
   a) Location Forms 30
1) Approach Buoys
2) Channel Edge Buoys (or Channel Limits Buoys)
3) In-Channel Buoys
  b) Hazard Buoys
  c) Buoy Names From Messages
  d) Names from Indirect Navigation Uses Forms
  1) Station Buoys
  2) Towing Buoys
  3) Anchor, Anchorage & Mooring Buoys
  e) Special Purpose Buoys
  f) Miscellaneous Buoys
3 Excerpts from Buoy Adjunct Terms
4 Major Floating Aids Terms
  a) Overarching Terms
  b) Lightship & Light Vessels
  c) Light Floats
  d) Large Navigational Buoys
Notes: New Terms & Differences in Studies

B Fixed Visual Aids
1 Fixed Lights
  a) Overarching Terms
    1) General Overarching Terms
    2) Overarching Terms for Major Lights
    3) Overarching Terms for Minor Lights
  b) Major Lights
    1) Subdivisions
    2) Major Light-Individual Entries
  c) Minor Lights
    1) Single-Member Structures
      (a) Narrower Types
      (b) Wider Types
    2) Multiple-Member Structures
    3) Enclosed/Composite/Single Structures
  d) Morphological Terms
    1) Major Lights

61
2) Minor Lights
   e) Character of Operations Terms
      1) Nature of Operations
      2) Specific Character of Light Operations
   f) Miscellanea
   g) General Character of Lights
Notes: Major Lights: New Terms & Differences in Studies
Notes: Minor Lights: Differences in Studies
2 Daybeacons
   a) Overarching Terms
      1) Basic Terms
      2) Shared & Foreign Language Terms
   b) Morphological Daybeacons
      1) Leading/Range Marks
      2) Signals
      3) Other Morphology Terms
   c) Physical Daybeacon Forms
      1) Unidirectional
         (a) Established Name
         (b) Local Names
      2) Structural Daybeacons
         (a) Structural Daybeacons Employing Overarching Terms
         (b) Established Names
         (c) Local/Descriptive Names
      3) Natural Marks
Notes: Daybeacons: New Terms & Differences in Studies
C Acoustical & Radio Aids
1 Acoustical Aids
   a) Fog Signal Overarching Terms
   b) Diaphone, Diaphragm, Reed, & Siren Signals
      1) Diaphone Signals
      2) Diaphragm Signals
         (a) Overarching Terms
         (b) Diaphragm Signals-Compressed Air
         (c) Oscillator Signals
3) Reed Horns
4) Sirens
c) Explosive, Percussion, Submarine & Whistle Signals
   1) Explosive Signals
   2) Percussion Aids
d) Submarine Signals
   65
e) Whistles
   65
f) Miscellaneous Signals
   66
Notes: Acoustical Aids: New Terms & Differences in Studies
2 Radio Aids
   a) General Overarching Radio Aids Terms
   72
   b) Radiobeacon Overarching Terms
   72
c) Radiobeacons-Main
   73
   1) Directional
   2) Nondirectional
   3) Rotating
   4) Composite
d) Radiobeacons-Other
   73
e) Radiobeacons-Character of Operation
   74
f) Hyperbolic Aids: Overarching Terms, Loran & Decca Forms
   74
   1) Overarching Aids
   2) Decca
   3) Loran
g) Hyperbolic Aids - Single & Quasi-Single
   75
h) Partially Hyperbolic Forms
   75
   1) Consol Forms
   2) Raydist Forms
i) Radar Aids: Reflectors
   76
   1) Overarching Terms & Corner Reflector
   2) Other Radar Reflectors
j) Radar: Secondary & Primary Radar
   76
   1) Overarching Terms & Primary Aids
   2) Shoran
   3) Transponder Beacons
k) Satellite Navigation
   77
   63
1) Overarching & Other Terms
2) GPS
3) Navy Transit Satellite Navigation Systems
4) Other Satellite Systems
  l) Other Radio Aids
     1) Radio/Sound Aids
     2) Miscellaneous Aids
Notes: New Terms & Differences in Studies

CHAPTER TWO TRAFFIC CONTROL DEVICES

A Light & Sound Signals
  1 Traffic Control Signals
     a) Overarching Terms & General Note
     b) Specific Entries
     c) Traffic Signal Operation
  2 Pedestrian Signals
  3 Traffic Signals-Other Types
  4 Flashing Beacons
     a) Overarching Terms
     b) Specific Entries
     c) Lighting Device
  5 Grade/Crossing/Level Crossing Signals
  6 Sound Traffic Signals
Notes: New Terms & Differences in Studies

B Warning Signs
  1 Categories & Overarching Terms
     a) Categories
     b) Overarching Terms
  2 Roadway Alignment Signs
     a) Introductory Note & Overarching Terms
     b) Specific Signs
  3 Roadway Condition Signs
     a) Introductory Note & General Terms
4 Intersection Signs
   a) Introductory Note & Overall Terms 94
   b) Specific Signs 94
5 Intermittent Moving Hazard Signs 95
6 Construction & Maintenance Signs 97
7 Other Hazards Signs
   a) General or Alternate Danger Signs 97
   b) Specific Signs 98
   c) Supplemental Plates/Plaques 99
      Notes: New Terms & Differences in Studies 99

C Informative Signs
1 Categories & Overarching Terms
   a) Categories 109
   b) Overarching Terms 109
2 Destination & Direction Signs 109
3 Route Markers
   a) Introductory Notes & Overarching Terms 110
   b) Specialized Route Markers 110
   c) Route-Marker Tabs 111
4 Mileposts 112
5 Signs Giving General Information
   Introductory Note
      a) Overarching & Sub-Overarching Terms 112
      b) Services Signs 113
      c) Parking Signs 114
      d) Recreation Signs 114
      e) Miscellaneous Signs 115
      Notes: New Terms & Differences in Studies 117

D Regulatory Signs
1 Categories 123
2 Priority Signs 123
3 Prohibitory & Restrictive Signs
   a) Prohibitory & Restrictive Signs 123
      1) One-way & Both Direction Signs

65
2) Categories of Exclusion Signs
3) Vehicular Exclusion: Weight, Height, & Length Signs
4) Miscellaneous Signs & Single Category Signs
   b) Prohibitory & Restrictive of Turns & U-Turns
      (About-Turns) Signs 125
   c) Prohibitory & Restrictive of Overtaking (Passing) Signs 125
   d) Prohibitory & Restrictive: Speed Limits Signs 125
   e) Miscellaneous, Single Forms, & End of Prohibitive
      Or Restrictive Signs 125
4) Mandatory Signs 126
5) Standing & Parkings Signs 128
6) Pedestrian Crossing Signs 129
7) Miscellaneous Regulatory Signs 129
8) Special Regulatory Signs: Temporary Traffic Control/Railroad
    Crossing/Schools/Bicycles 129
Notes: New Terms & Differences in Studies 130

E Traffic Markings
1) Overarching & Sub-Overarching Terms
   a) Overarching Terms with General Notes 135
   b) Sub-Overarching Terms 136
      1) More General Terms
      2) More Restricted Terms
      3) Transportation-Marking Studies Category Terms
2) Pavement & Curb Markings
   a) Longitudinal Markings 136
      1) Center Line Markings
      2) Edge Lines
      3) Lane Markings
      4) Other Longitudinal Markings
   b) Transverse Markings 138
   c) Other Pavement & Curb Markings 139
3) Hazard, Obstruction, Delineation Markings
   a) Hazard & Obstruction Markings 140
   b) Delineators 140
   c) Barricades & Channelizing Devices 140
CHAPTER THREE  RAILWAY SIGNALS, SIGNS, MARKERS

A  General Railway Signal Terms
   1  Overarching Terms
      a)  Signals
      b)  Fixed/Lineside/Railway-Railroad/Wayside Signals
      c)  Other Overarching Terms
      d)  Possible/Partial Overarching Terms
          1)  Energy & Technology-Related Terms
          2)  Physical-Morphological Overlapping Terms
          3)  Possible Overarching Terms-Miscellaneous
          4)  Terms Including Hardware Components
   2  Message, Morphology & System Terms
      a)  Messages: Aspects & Indications
          1)  Color
          2)  Aspects
          3)  Indications
      b)  Morphology
          1)  Overarching Terms
          2)  Stop Signals
          3)  Starting Signals
          4)  Distant Signals
          5)  Systems
          6)  Route & Junction Signals
          7)  Other Signals-Running Operations
          8)  Subsidiary Signals
          9)  Physical Shunting Signals
         10)  Function-Related Shunting Signals
         11)  Sidings, Train Yard & Other Signals
         12)  Message-Related Signal Terms
         13)  Miscellaneous Signals
      c)  Systems
          1)  Overarching Terms
2) Manual Block Signal Systems
3) Controlled Manual Block Signal Systems
4) Automatic Block Signal Systems
5) Absolute/Permissive Signals
6) Other Block Signals
7) Interlocking Signalling
8) Train Control
9) Specific Named Systems

Notes: New Terms & Differences in Studies

B Fully & Partially-Lighted Signals
1) Overarching Terms
2) Color Light Signals
   a) Principal Signal Types
      1) Basic
      2) Limited-Variant
      3) Variant
      4) Signaling
   b) Other Color Light Signals
      1) Distance Signals
      2) Lens Arrangement Terms
      3) Morphology & Other Terms
3) Searchlight Signals
4) Other All-Lighted Signals
   a) Single Lens Units: Morphological Dimension
      Frequently Present
      1) Signal Terms Slightly More Morphological
         Than Physical
      2) Signal Terms Somewhat More Morphological
         Than Physical
   b) Dwarf Signals [Frequently Multiple Lens]
   c) Undifferentiated Physical Signals
5) Position Light, Color Position Light, & Alphanumeric,
   Graphic & Geometric Signals
   a) Position Light Signals
   b) Color Position Light Signals

68
c) Symbolic Signal Types  
   General Note  
   1) Multi-Lamp/Theatre Indicators  
   2) Stencil Indicator  
   3) Other Indicators  

6 Cab Signals  
   a) Major Cab Signal Types  
   b) Operational Terms-Cab Signals  
   c) Partly Morphological Terms  
   d) Other Cab Signals  
   e) Cab Signals with Sound Dimension [Primarily Acoustical Signal segment]  

7 Partially-Lighted Signals: Semaphores  
   a) Overarching Terms  
   b) Types of Semaphores  
      1) Lower Quadrant & Upper Quadrant Signals  
      2) Somersault Signals  
   c) Semaphores: Methods of Operation  
   d) Semaphores: Morphologically-Related Terms  
   e) Semaphores: System-Related Terms  
   f) Other Semaphores Terms  

8 Partially-Lighted Signals: Signal Boards, Disc Signals & Other Forms  
   a) Signal Boards  
      1) Overarching Terms & Terms in Other Languages  
      2) Specific Board Terms  
   b) Disc Signals  
      General Note  
      1) Disc Signals Containing the Word Disc  
      2) Banner Signals (Exposed Disc Form Under then Banner Name)  
   c) Morphological-related Terms  
      General Note  
      1) Switch Signals
3) Route Indicators
4) Other Morphological Signal Terms

d) Other Signals
   1) Crossbar Signals
   2) Flag Signals
   3) Lighted Signs & Boards
   4) Track Indicators
   5) Miscellaneous Signals

Notes: New Terms & Differences in Studies

C Unlighted Visual Devices

1 Unlighted Fixed Types with Constant Message
   General Note
   a) Location Signs
   b) Transportation Signs
      1) Speed Control Signs
         (a) Speed Control & Restriction Signs
         (b) UAR Speed Signals (=Signs)
         (c) Speed Zone Signs
         (d) Other Speed Signs
      2) Location Signs
         (a) Advance Location Signs
         (b) Limit & Location Signs
         (c) Territory Limits Signs
      c) Maintenance of Way Signs
   d) Safety Signs
   e) Marks & Markers
   f) Boards & Posts
   g) Plates & Flags
   h) Other Devices
      1) Overarching Terms
      2) Blue Flags
      3) Electric Traction Signs
      4) Miscellaneous Signs

2 Targets
   General Note
a) Overarching Terms 195
b) Morphological-Related Terms 195
   General Note 195
   1) Shape Targets 195
   2) Color & Position Targets 195
   3) Terms Relating to Railroad Functions 196
c) Other Targets 196
d) Switch Stands 196
Note: Signs: New Terms & Differences in Studies 196
Including the Problems of Correlating Classifications 197
& Database 197
D Acoustical & Radio Signals 198
1 Acoustical Signal Terms 198
   a) General Note & Overarching Terms 202
   b) Explosive Signals 202
   c) Level/Grade Crossing Sound Signals 202
   d) Cab & Train Control Sound Signals 203
e) Other Sound Signals 204
2 Radio Signal Terms 204
   Note 204
   a) Overarching Terms 205
   b) Satellite Systems 205
c) Other Radio Signals 205
Note: New Terms, General Note & Differences in Studies 205
E Level/Grade Crossing Signs, Signals, Markers 206
   & Other Devices 206
   General Note 207
   1 Integrative Level Crossing/Grade Crossing Signals 208
   2 Lighted Level Crossing/Grade Signal Crossing Signals 208
   3 Barriers & Gates 209
      a) Barriers, Full Gates, & Gates 209
      b) Half Barriers & Gates 210
   4 Sound Signals 210
   5 Signs 211
   6 Open Crossings 212
6 Open Crossings 212
   Note: New Terms & Differences in Studies 212
F Staff & Ticket, Tablet, Token, Train Order & Time Interval Signals 214
   1 Staff 214
   2 Staff & Ticket 215
   3 Tokens 215
   4 Tablet & Tablet & Tokens 216
   5 Tokenless Block Working 217
   6 Train Order 217
   7 Time Interval 217
   8 Other Devices 218
   Note: New Terms & Differences in Studies 218

CHAPTER FOUR AERO NAVIGATION AIDS

A Overarching Terms: General, Visual & Lighted Terms 220
   1 General Terms for All Aero Navigation Aids 220
      a) Primary Terms 220
      b) Specialized Terms 220
   2 Visual Aids Terms 221
   3 Sub-Overarching Terms 222
      General Note
   4 Overarching Terms for Lighted Aero Navigation Aids 222
      a) Light & Lighting Aids Terms 222
      b) Airfield & Airport Light/Lighting Terms 222
B Beacons & Obstruction Lighting 223
   General Note 223
   1 Overarching Terms 223
   2 Physical Apparatus 224
      a) Method of Operation-Related Terms 224
      b) Dimension-Related Terms 224
      c) Energy Source-Related Terms 225
   3 Morphological Terms 225
      a) Airport Beacons 225
2) Code Beacons
   b) Airway Beacons 226
   c) Heliport & Other Beacons 226
4 Miscellaneous Beacons & Support Structures
   a) Miscellaneous Beacons 227
   b) Support Structures 227
5 Obstruction Lighting
   General Note
   a) Overarching Terms 227
   b) Beacons 228
   c) Obstruction Lights-Incandescent & Miscellaneous Types 228
   d) Obstruction Lighting-Strobe & Composite Types 229
C Approach Lighting
  1 Overarching Terms
     a) Major 229
     b) Secondary 230
     c) Sub-Overarching Terms 230
  2 Equipment Terms
     a) Physical Terms 230
     b) Physical/Morphological Terms 231
     c) Support Structures 232
  3 Approach Lighting Systems
     General Note
     a) Approach Lighting Systems 232
     b) Special Approach Lighting Types 234
     c) Historic Terms 234
        1) Slopeline Systems
        2) Center Line Systems
        3) Other Historic Approach Lighting Systems
  4 Final Approach Equipment
     a) Overarching Terms 238
     b) Precision Approach Path Indicators 238
     c) VASI Systems 239
        1) Systems 239
2) Operational Types

d) Other Types

1) Glide Path
2) Tri-Color
3) Fresnel
4) PLASI
5) Miscellaneous Systems

D Runway & Taxiway Lighting

1 Runway Lighting

a) Overarching Terms
b) Runway Edge Lights
c) Runway Centerline Lights
d) Threshold, Touchdown Zone, Runway End & Other Lights
e) Runway Equipment Terms

1) General Terms
2) Physical Apparatus
3) Light Equipment By Intensity

2 Taxiway Lighting

a) Overarching Terms
b) Taxiway Edge Lighting
c) Taxiway Centerline Lighting
d) Physical Apparatus & Other Terms

1) Physical Apparatus
2) Other Taxiway Lights

3 Historic & Composite Terms

a) Historic Terms: Boundary, Contact & Range Lights
b) Composite Terms

Notes: New Terms & Differences in Studies

E Radio Aids

1 Overarching Terms

a) General Terms
b) Sub-Overarching Terms
c) Special Terms

2 Terminal Navaids/Aids to Final Approach & Landing
a) General Terms 257
b) Historic Terms 257
   1) Overarching Terms
   2) Systems
   3) Components
c) Instrument Landing Systems, ILS 259
   1) Overarching Terms
   2) Other Terms
   3) ILS Components
   4) Microwave Landing Systems, MLS
      (a) Principal Terms
      (b) MLS Constituents & Other Terms
3 En-Route Aids 262
   a) Historic Terms 262
      1) Early Terms
      2) Intermediate Terms
   b) VOR/VORTAC/DME/TACAN Aids 263
      General Note
      1) VOR, VHF Omnidirectional Radio Range
      2) Distance Measuring Equipment, DME
      3) TACAN/Tactical Air Navigation
      4) Composite Systems
c) Hyperbolic Aids 265
      General Note
      1) Overarching Terms
      2) Loran
      3) Decca
      4) Consol
      5) Omega
      6) Miscellaneous Hyperbolic Aids
d) Satellites Navaids 267
      1) GPS
         (a) Overarching Terms
         (b) Specialized & Composite Terms
         (c) Navstar GPS
(d) Glonass

2) Augmentation Terms
   (a) DGPS
   (b) WAAS & LAAS Augmentation
   (c) GNSS
   (d) Other Satellite Navigational Systems
       (1) Satellite Navigation Terms
       (2) Transit & US Navy System
       (3) Miscellaneous Systems

4 Intercategory Group: Beacons
   a) Nondirectional Beacons 272
   b) Marks, Markers, Beacons 273
   c) Miscellaneous Beacons 275

Notes: New Terms & Differences in Studies 276

F Signs, Markings, Markers & Marks
  1 General Notes & Overarching Terms 286
  2 Marks & Markers 286
  3 Other Forms
     a) Reflective Aids 289
     b) Signal Panels, Signal Areas, Indicators, Other Objects & Miscellanea 290

4 Signs & Markings
   General Note
   a) Overarching Terms 291
   b) Runway Markings 291
   c) Taxiway Markings 292
   d) Markings Other Than Overarching, Runway, Taxiway, Special Categories 293
   e) Special Category 295
      1) Heliport & Vertiport Markings
      2) Holding Position Markings
      3) Obstruction Markings
      4) Apron Markings
5 Signs
   a) Overarching Terms 298
   b) Signs Other Than Runway & Taxiway Types 299
   c) Runway Signs 300
   d) Taxiway Signs 300
   e) Special Category: Holding Position Signs 301
   f) Signs-Other 302
Notes: Differences in Studies 302

BIBLIOGRAPHY 304
PREFACE
ACKNOWLEDGEMENTS
ABBREVIATIONS

CHAPTER ONE
PRELUDE TO MODERN TRANSPORTATION-MARKING HISTORY

A Early History of Transportation-Markings
   1 Survey of T-M Before 1750: Marine Aids 21
   2 Survey of T-M Before 1750: TCDS 25
B Changes in the Context of T-M: The Industrial Revolution, 1750-2000
   1 Introduction & Early History
      a) Introduction & Terminology 26
      b) Early History 27
   2 The First Industrial Revolution, 1750-1870
      a) First Industrial Revolution, 1750-1830 29
      b) Second Industrial Revolution, 1830-1870 32
   3 New Industrial Revolution, 1871-1940 35
   4 Third Industrial Revolution, 1940-2000 38

CHAPTER TWO
VISUAL AIDS I, 1750-1920

A 1750-1870
   1 Introduction 41
   2 Railway Signals
      a) Early Railway Signals 42
      b) Developments in Railway Signals 44
3 Road Markings, Signs, Signals 45
4 Lighthouses & Other Fixed Lights
   a) Structures 48
   b) Lighting 51
   c) Messages 53
5 Floating Aids
   a) Buoys & Technology 55
   b) Messages 57
   c) Lightships 58
B Visual Aids II, 1870-1920
   1 Introduction & Aero Aids 60
   2 Traffic Control Devices, 1870-1920
      a) Traffic Signs: Introduction 61
      b) Signs & Sponsoring Organizations 62
      c) Traffic Signals 64
      d) Pavement Markings 67
3 Railroad Signals
   a) Types of Signals: Introduction & Semaphores 61
   b) Types of Signals: Light Signals 69
   c) Messages: Colors 70
   d) Messages: Arms, Boards & Tablets 73
   e) Systems 75
4 Marine Aids to Navigation, 1870-1920
   a) Introduction 76
   b) Illuminants, Burners & Accoutrements 77
   c) New Aids, 1870-1920 80
   d) Messages & Systems 82

CHAPTER THREE
VISUAL AIDS II, 1920-2000

A Aeronautical Navigation Aids
1 Introduction to Visual Aids II 85
2 Early Development of Visual Aero Aids, 1920-1943 86
3 International Cooperation in Aero Aids 91
4 Development of Visual Aero Aids, 1944-2000
   a) Visual Aids Other Than Approach Aids 92
   b) Approach Lighting 95
B Marine Aids to Navigation
1 Buoyage & Beaconage Systems, 1924-1957
   a) Introduction & IHB Efforts 100
   b) League of Nations Conferences & Systems 101
2 IALA Buoyage system 102
3 Visual Aids to Navigation in the 20th Century:
   On the Cusp of Decline? 104
C Railway Signals
1 Railway Signals & Expansion: 1920 & Beyond
   a) Introduction 108
   b) Railway Signals 108
2 Railway Signal Systems 110
D Traffic Control Devices, 1926-2000
1 Traffic Control Developments, 1920-1950
   a) Introduction, Europe & League of Nations, 1926-1939 114
   b) Americas, Africa, Middle East, Asia & Pacific,
      Old British System, 1922-1950 115
   c) The 1949 UN Conference: The Protocol 121
   a) UN GERSS 1952 123
   b) IAMM, ECAFE & Changes, 1952-1968 124
3 Global Traffic Control Devices: UN Conference 1968
   & Afterwards 127

CHAPTER FOUR
RADIO AIDS, 1904-2000

80
A  Radio Navaids: Early Days & En-Route Navaids
   1  Introduction to Radio Navaids  130
   2  Early Days: Radio Navaids Before 1920  131
   3  Point-Source Aids
      a) Radio Range  133
      b) Beacons  135
      c) VOR, VOR/DME, VORTAC, TACAN  138
      d) Radar Aids  140
B  Hyperbolic Aids
   1  Introduction  143
   2  Early Hyperbolic Aids  144
   3  GEE & Loran Systems
      a) GEE  145
      b) Loran  147
   4  Decca Group of Navaids  150
   5  Other Radio Navaids Forms
      a) Radux, Radux-Omega & Omega  153
      b) Other Radionavigation Systems  154
C  Satellite Navaids
   1  Introduction & Early Satellite Aids  155
   2  Global Positioning Systems (GPS)
      a) Origins & Development  157
      b) Augmentation  158
D  Final Approach & Landing Aids
   1  Introduction & Early Years  162
   2  Instrument Landing Systems (ILS)  164
   3  Microwave Landing Systems (MLS)  166

CHAPTER FIVE
SOUND SIGNALS
A Marine Fog Signals
1 Fog Signals, 1750-1870 169
2 Fog Signals, 1870-1920 173
3 Fog Signals, 1920-2000 176
B Road, Rail, Aero Sound Signals
1 Road Sound Signals 180
2 Rail Signals
  a) Explosives 181
  b) Cab Signals & Related Signals 183
  c) Crossing Signals 184
  d) Other Signals 186
3 Aero Signals 186

BIBLIOGRAPHY

i Books & Reports 189
ii Journals 199
iii Government Publications 204
iv Trade Literature 209
v The Bible in Translation (Jeremiah 31:21) 209

INDEXES

i T-M Types 211
ii Names 224
“Under classification we may include all arrangements of objects or names, which we make for saving labour in the discovery of an object. Even alphabetical indices are real classifications. No such arrangement can be of use unless it involves some correlation of circumstances, so that knowing one thing we learn another. If we merely arrange letters in the pigeon-holes of a secretaire we establish a correlation, for all letters in the first hold will be written by persons, for instance, whose names begin with A, and so on. Knowing then the initial letter of the writer’s name, we know also the place of the letter, and the labour of search is thus reduced to one twenty-sixth part of what it would be without arrangement.”

1st edition, 1874, 2nd edition, 1877
Dover edition (New York), 1958
INDEX-T-M FORMS

Absolute/Permissive Signals, 68
Absolute/Permissive Systems, 48
Acoustical Aids, 62
Acoustical & Radio Aids, 62
Acoustical & Radio Signals, 52, 71
Acoustical Signals, 52, 71
Acoustical Transportation-Markings, 11
Advance Location Signs, 51, 70
Aero Aids, 29, 79, 80
Aero Electronic Navigation Aids, 31
Aero Nav Aids, 29, 31
Aero Navigation Aids, 29, 30, 32, 33, 72
Aero Signals, 82
Aeronautical Lighted Aids, 54
Aeronautical Navigation Aids, 13, 15, 29, 54, 79
Aero T-M/Aeronautical T-M, 29
Aids, 21, 31, 63, 79
Aids for Surface Transportation, 33
Aids for Water & Air Transportation, 33
Aids to Final Approach & Landing, 58
Airfield & Airport Beacons, 55, 72
Airfield & Airport Lights/Lighting, 54, 72
Airport Beacons, 55, 72
Airway Beacons, 55, 73
All-lighted Signals, 26, 48, 49, 68
Anchor, Anchorage & Mooring Buoys, 36, 61
Approach Aids, 80
Approach Buoys, 35, 61
Approach Lighting, 30, 55, 73, 80
Approach Lighting Systems, 54, 55, 73
Apron Markings, 57, 76,
Cab-Signal, 26
Can & Conical Buoys, 60
Can/Cylindrical Buoys, 18
Can & Cone Buoys, 35
Center Line Markings, 44, 66
Center Line Systems, 55, 73
Channel Edge Buoys, 35, 61
Channel Limits Buoys, 61
Code Beacon, 54, 55, 73
Color & Position Targets, 71
Color Light Signals, 48, 49, 68
Color-Light Signals, 26
Color Position Light Signals, 68
Color-Position Light Signal, 49
Color-Position Signal, 26
Combination Buoy, 35, 60
Combination Signals, 39
Composite Radiobeacon, 39, 63
Conical Buoys, 18
Conical & Can/Cylindrical Buoys, 18
Construction & Maintenance Signs, 42, 65
Consol, 40, 59, 63, 75
Controlled Manual Block Signal System, 48, 68
Corner Reflectors, 40, 63
Crossbar Signals, 50, 70
Crossing Signals, 82
CTC, 48

Danger Warning Signs, 22
Daybeacons, 18, 19, 38, 61, 62
Daymarks, 38
Decca, 39, 59, 63, 75, 81
Decca Aids, 39

86
Delineators, 44, 66
Destination & Direction Signal, 65
Destination & Distance Signs, 41
DGPS, 58, 59, 76
Diaphone, 62
Diaphone Fog Signals, 39
Diaphone, Diaphragm, Reed & Siren Signals, 62
Diaphragm Horn, 39
Diaphragm Signals, 62
Diaphragm Signals-Compressed Air, 39, 62
Diaphragm Signals-Oscillator, 39
Direction Finding, 59
Directional Radiobeacon, 39, 63
Disc Signals, 50, 69
Distance Signals, 68
Distant Signals, 47, 67
Distance Measuring Equipment, DME, 58, 75
DME (Distance-Measuring Equipment), 56
Dwarf Signals, 49, 68

Edge Lines Markings, 44, 66
Electric Traction Forms, 51, 70 (Signs)
Electronic Marine Aids to Navigation, 19
Electronic Navigation Aids, 15
Electronic T-M, 10
Elevated Lights, 30
Elevated Markings, 15
Enclosed/Composite/Single Structures, 61
End of Prohibitive or Restrictive Signs, 66
En-Route Aids, 58, 75
Exclusion Categories of Vehicule Forms, 42
Exclusion Signs, 66
Explosives, 63, 82
Explosive, Percussion, Submarine & Whistle Signals, 63
Explosive Signals, 39, 52, 71
Final Approach Equipment, 73
Final Approach Indicators, 55
Final Approach & Landing Aids, 81
Final Approach & Miscellaneous Forms, 56
Final Approach Lighting, 30
Fixed Aids, 15
Fixed Lights, 36, 61, 79
Fixed Lighted Markings, 18
Fixed Lighted Marine T-M, 18
Fixed/Lineside/Railway-Railroad/Wayside Signals, 46, 67
Flag Signals, 50, 70
Flashing Beacons, 43, 64
Floating Aids, 15, 35, 36, 61, 79
Floating Aids to Navigation, 18
Floats, 36
Fog Signals, 19, 38, 62, 82
Free-Standing Geometric Signals, 27
Free-Standing Signals, 52
Fresnel Forms, 56, 74
Fully & Partially Lighted Signals, 68
Fully-Integrated Semaphore Signals, 27
Fully Integrated Systems, 31, 67

GEE, 81
GEE & Loran Systems, 81
General or Alternate Danger Signs, 42, 65
Geometric & Graphic Signals, 27
Geometric Signals, 27
Glide Path Forms, 56, 74
Global Positioning System (GPS), 40, 81
GLONASS, 59, 76
GNSS, 59, 76
Gongs, 39
GPS, 58, 59, 64, 75
Grade Crossing/Level Crossing Signals, 43, 64
Graphic, Geometric, & Alphanumeric Signals, Types, 26, 27
Graphic & Geometric Signals, 27
Graphic Signals, 27
Half Barriers & Gates, 52, 71
Hazard & Delineation Marking, 44
Hazard & Obstruction Markings, 66
Hazard, Obstruction, Delineation Markers, 66
Hazard/Obscuration, 44
Hazard Buoys, 36, 61
Hazard Signs, 42, 65
Heliport Beacons, 55
Heliport & Other Beacons, 73
Heliport & Vertiport Markings, 57, 76
Holding Position Markings, 57, 76
Holding Position Signs, 57, 77
Horizontal Markings, 44
Hyperbolic Aids, 40, 58, 63, 75, 81
Hyperbolic Forms, 39
Hyperbolic Systems, 19, 39

IALA Buoyage System, 36, 80
IALS, 75
IMC-Influenced Buoyage Systems, 18
In-Channel Buoys, 61
Independent & Partially Integrated Aids, 31
Indicators, 30, 69
Indicators, Markers, Obstruction & Restricted Use Markings, 30
Indirect Navigational Buoys, 36
Informative Signs, 22, 41, 65
Inset Lights, 30
Inset & Elevated Lights, 30
Instrument Landing Systems (ILS), 31, 58, 75, 81
Integrative Level Crossing & Grade Crossing Terms, 52,
Integrative Level Crossing/Grade Crossing Signals, 71
Interlocked Signalling, 68
Interlocking Terms, 48
Intersection Signs, 42, 65
Intermittent Moving Hazards Signs, 42, 65

Lane Markings, 44, 66
Large Navigation Buoys, 36, 61
Leading/Range Marks, 38, 62
Level Crossing/Grade Crossing Sound Signals, 71
Level/Grade Crossing Signs, Signals, Markers, 52, 71
Light & Lighting Aids, 54, 72
Light & Sound Signals, 64
Light Equipment, 74
Light Float, 36, 61
Light Signals, 79
Lighted Aero Navigation Aids, 54, 72
Lighted Buoys, 18, 35, 60
Lighted Level Crossing & Grade Crossing Signal, 52, 71
Lighted Navigation Aids, 15
Lighted/Partially Lighted Signals, 15
Lighted Signs & Boards, 50, 70
Lighthouses & Other Fixed Lights, 79
Lighting Devices, 43, 64
Lighted & Lighted-Sound Buoys, 18
Lighted Marine Markings, 18
Lighted-Sound Buoys, 18
Lighthouses, 79
Lights, 61
Lightships, 79
Lightships & Light Vessels, 36, 61
Limits & Location Signs, 51, 70
Lineside Signals, 46
Location Signs, 51, 70
Longitudinal Markings, 44, 66
Loran, 39, 63, 75, 81
Lower Quadrant & Upper Quadrant Signals, 50, 69
Lower Quadrant Forms, 50

Maintenance of Way Signs, 51, 70
Major Floating Aids, 36, 61
Major Lights, 37, 61, 62
Mandatory Signs, 43, 66
“Manned” & Manually Operated Barriers, 52
Manual Block Signal System, 48, 68
Marine Aids, 78
Marine Aids to Navigation, 13, 15, 17, 35, 60, 79
Marine Aids to Navigation with Floating & Fixed Aids Submodes, 32
Marine Fog Signals, 82
Marine Transportation-Markings, 19
Markings, Other Than Overarching, Runway, Taxiway, Special Categories, 76
Markings: Overarching, Runway & Taxiway, 57
Markings: Other Than Overarching, Runway Taxiway, 57, 76
Markings, 13, 14, 15, 16, 18, 20, 23, 30, 43, 44, 57, 66, 76, 79
Markings & Signs, 27
Marks, 36, 57
Marks & Markers, 51, 57, 70, 76
Marks, Markers, Beacons, 59, 76
Marks, Markings & Miscellaneous Terms, 57
Marker, Marker, Marking, 13
Mark/Marker/Marking, 13
Markers, 30, 57
Microwave Landing Systems (MLS), 31, 58, 75, 81
Mileposts, 41, 65
Minor Lights, 37, 61, 62
Miscellaneous Buoys, 18, 36, 40, 61
Miscellaneous Navigation & Non-Navigation Systems, 19
Miscellaneous Forms, 40, 64
Miscellaneous Beacons, 73, 76
Miscellaneous Hyperbolic Aid Forms, 58, 59
Miscellaneous Regulatory Signs, 43, 66
Miscellaneous Signals, 39, 48, 63, 65, 67, 70
Miscellaneous Signs, 51, 65, 70
Miscellaneous Signs, Single Forms, & End of Prohibitive or Restrictive Signs, 66
Miscellaneous Systems, 74
MLS, 58, 75
MLS Systems & Constituent Terms, 58
Multiple-Member Structures, 61
Multi-Lamp Theatre Indicators, 49
Multi-Lamp/Theatre Indicators, 69
Multi-Mode Radio Aids, 32

Natural Marks, 38, 62
Naval Transit Satellite Navigation Systems, 40, 64
Navstar GPS, 59, 76
Nondirectional Beacon, 39, 59, 76
Non-Directional Beacons/Nondirectional Radiobeacon (NDB), 63
Non-Sign Markings, 27

Obstruction Lights, 30, 54, 55, 73
Obstruction Lighting, 54, 55, 73
Obstruction Lights-Incandescent & Miscellaneous, 55, 73
Obstruction Lights-Strobe & Composite, 55, 73
Obstruction Markings, 30, 56, 76
Omega, 59, 75
One-Way & Both Direction Forms, 42, 65
Open Crossings, 71
Oscillator Signals, 39, 62
Other Devices, 71
Other Hazards Signs, 42, 65
Other Signals-Running Operations, 67

Parking Signs, 41, 65
Partially & Non-Integrated Semaphores Models, 27
Partially Hyperbolic Aids, 40
Partially Hyperbolic Forms, 63
Partially-Lighted & Unlighted Aero Navigation Aids, 30
Partially-Lighted & Unlighted Signals, Signs, Markings, 27
Partially-Lighted Signals, 49, 69
Partially-Lighted Signals: Semaphores, 69
Partially-Lighted Signals: Signal Boards, Disc Signals & Other Forms, 69
Pavement & Curb Markings, 44, 66
Pavement Markings, 15, 44, 79
Pedestrian Crossing Signs, 43, 66
Pedestrian Signals, 43, 64
Percussion Aids, 63
Percussion Signals, 39, 63,
Percussion Forms, 39, 63
Physical Buoys, 60
Physical Daybeacons, 38, 62
Physical Markers, 57
Physical Shunting Signals, 67
Physical Signals, 68
PLASI Forms, 56, 74
Plates & Flags, 70
Plates, & Flags Forms, 51
Point-Source Aids, 81
Points Indicators, 50, 69
Position & Color-Position, 26
Position-Light & Color-Position Signals, 26
Position Light, Color Position, & Alphanumeric, Graphic & Geometric Signals, 68
Position Light, Color-Position Lights & Symbolic Forms, 49
Position Light Signals, 49, 68
Precision Approach Path Indicator, 56, 73
Primary Aids, 63
Priority Signs, 42, 65
Prohibitory & Restrictive of Entry Signs, 42, 65
Prohibitory & Restrictive: Overtaking (Passing) Signs, 43, 66
Prohibitory & Restrictive Signs, 42, 65
Prohibitory & Restrictive: Speed Limit Signs, 43, 66
Prohibitory & Restrictive: Turns & U-Turns (About Turns) Signs, 43, 66
Prohibitory & Restrictive of Turns & U-Turns (About-Turn) Signs, 66

Radar Aids, 40, 63, 74, 81
Radar Aids: Reflectors, 63
Radar: Secondary & Primary Radar, 63
Radar Primary Forms, 40
Radar Reflector Aids, 40
Radio Aids, 39, 58, 63, 64, 74, 80
Radio Navaids, 81
Radio Range, 81
Radio Signals, 52, 71
Radiobeacons, 39, 63
Radionavigation Systems, 81
Radio/Sound Aids, 64
Radux, Radux-Omega & Omega, 81
Railroad Signals, 79
Railroad Signals & Other Devices, 13
Rail Signals, 82
Railway Indicators, 15
Railway Marks, 46
Railway Markers, 46
Railway-Railroad Signals, 46, 67
Railway Signalling, 25
Railway Signal Systems, 80
Railway Signals, 15, 25, 46, 67, 80
Railway Signals, Signs, & Indicators, 15
Railway Signals, Signs, Marks, Markers, 46
Railway Signals, Signs, Markers, 32, 33, 67
Railway Signs, 15, 27, 46
Raised Pavement Markers, 44
Raydist, 40, 63
Recreation Signs, 41, 65
Reed, 39
Reed Horn, 63
Reflective Aids, 57, 76
Regulatory Signs, 22, 42, 65
Restricted Use Area Visual Aids, 30
Restricted Use Markings, 30
Road Markings, Signs, Signals, 79
Road, Rail, Aero Sound Signals, 82
Road Signs, 23
Road Sound Signals, 82
Roadway Alignment Signs, 42, 64
Roadway Conditions Signs, 42, 64
Rotating & Revolving Discs & Panels, 27
Rotating Radiobeacons, 39, 63
Route & Junction Signals/Indicators, 47, 67
Route Indicators, 50, 70
Route Marker, 41, 65
Route-Marker Tabs, 65
Runway Centerline Lights, 55, 56, 74
Runway Edge Lights, 56, 74
Runway Equipment, 56, 74
Runway Markings, 56, 57, 76
Running Signals, 47
Runway & Taxiway Lighting, 30, 56, 74
Runway & Taxiway Markings, 57
Runway Lighting, 56, 74
Runway Signs, 57, 77

Safety Signs, 51, 70
Satellite Aids, 40, 81
Satellite Navaids, 59, 75, 81
Satellite Navigation 59, 63, 76
Satellite Navigational System, 76
Satellite Navigation Aids Forms, 40, 59, 75
Satellite Navigational Systems, 76
Satellite Systems, 40, 64, 70
Searchlight Signals, 49, 68
Secondary & Primary Radar Forms, 40
Semaphore Signals, 27, 50, 69, 79
Semaphoric Signals, 26
Service Signs, 41, 65
Shape Targets, 71
Shoran, 40, 63
Shunt Signal/Indicators, 47
Shunting Signals, 47, 67
Siding, Train Yards & Other Signals, 48, 67
Signal Boards, 27, 50, 69
Signal Board, Disc Signals & Other Forms, 50, 69
Signal Panels, Signal Areas, Indicators, 57, 76
Signals, 13, 15, 21, 25, 26, 27, 28, 32, 33, 38, 39, 43, 46, 47, 48, 52, 57, 62, 63, 64, 67, 68, 69, 70, 71, 78, 79, 80, 82
Signals Attached to Other Devices, 52
Signal Systems, 26
Signal & Points Indicators/Signals, 47
Signals, Signs, Markings, 26
Signaling, 68
Signalling, 26, 49
Signs, 13, 15, 16, 23, 27, 28, 30, 32, 33, 41, 42, 43, 44, 51, 57, 64, 65, 70, 71, 76, 77
Signs & Boards, 53
Signs & Markings, 16, 30, 57, 76
Signs & Pavement Markings & Elevated Markings, 15
Signs From Other Than Runway & Taxiway, 57
Sign Forms-Other, 57
Signs Giving General Information, 41, 65
Signs, Markings & Related Devices, 15
Signs & Unlighted Signals, 15
Signs, Markings, Markers, Marks, 55, 76
Sign Forms Other Than Runway & Taxiway Types, 57, 77
Signs, Signals & Markings, 28
Single Forms of an Unitary Nature: Past and Present, 35
Single Lens Units, 49, 68
Single Category Signs, 66
Single-Member Structures, 61
Siren Buoys, 60
Sirens, 39, 63
Slopline Systems, 55, 73
Somersault Signals, 50, 69
Sound Buoys, 18, 35, 60
Sound-Radio Aids, 40
Sound/Radio Forms, 40
Sound Signals, 52, 71, 81
Sound Traffic Signals, 64
Spar Buoys, 18, 35, 60
Spars, Standards & Miscellaneous Buoys, 18

97
Special Purpose Buoys, 36, 61
Special Regulatory Signs: Temporary Traffic Control/Railway Crossing/Schools/Bicycles, 66
Speed Control, 48
Speed Control Signs, 51, 70
Speed Control & Restrictions Signs, 51, 70
Speed Signs, 70
Speed Zone Signs, 70
Staff, 52, 72
Staff, Tablet, Tickets, & Tokens, 28
Staff & Ticket, 52, 72
Staff & Ticket, Tablet, Token, Train Order & Time Interval Signals, 72
Staff, Ticket, Token, Tablet, Train Order & Time Interval, 52
Standard & Non-Standard Buoys, 60
Standing & Parking Signs, 43, 66
Standard Buoys, 18
Starting Signals, 47, 67
Station Buoys, 36, 61
Stencil Indicators, 49, 69
Stop, Distant & Related Signal Terms, 47
Stop Signals, 47, 67
Structural Daybeacons, 38, 62
Submarine Signals, 39, 63
Subsidiary Signals, 47, 67
Supplemental Plates/Plaques, 42, 65
Surface Transportation-Markings, 32
Switch Indicators, 47
Switch Indicators/Signal & Points Indicators/Signals, 47
Switch Signals, 69
Switch Stands, 71
Switch Stand Terms, 52
Switch Terms, 50
Symbolic Forms, 49

98
Symbolic Signals, 69

Tablets, 52
Tablets & Tablets & Tokens, 52, 72
TACAN/Tactical Air Navigation, 58, 75
Targets, 51, 70, 71
Taxiway Centerline Lighting, 55, 56, 74
Taxiway Edge Lighting, 56, 74
Taxiway Lights, 74
Taxiway Lighting, 56, 74
Taxiway Marking, 56, 57, 76
Taxiway Signs, 57, 77
TCDs, 78
Terminal Aids, 58
Terminal Navaids/Aids to Final Approach & Landing, 58, 74
Territory Limits Signs, 51, 70
Threshold, Touchdown Zone, Runway Ending & Other Lights, 56, 74
Time Intervals Forms, 52, 72
Token, 52, 72
Tokenless Forms, 52
Tokenless Block Working, 72
Towing Buoys, 36, 61
Track Indicators, 50, 70
Traffic Control, 48
Traffic Control Devices (TCD), 13, 15, 20, 22, 32, 33, 41, 45, 63, 64, 79, 80
Traffic Control Signals, 15, 43, 64
Traffic Markings, 20, 23, 43, 45, 66
Traffic Signals, 20, 21, 22, 43, 44, 64, 79
Traffic Signs, 20, 44, 79
Train Control, 48
Train Order Forms, 52, 72
Train Stop, 48
Transit, 59
Transit & US Navy System, 59, 76
Transponder Beacon, 40, 63
Transportation-Markings Category Terms, 65
Transportation Signs, 51, 70
Transverse Markings, 44, 66
Tri-Color Forms, 56, 74
UAR Speed Signals, 70
Unidirectional [Daybeacons], 38
Uniform System of Buoys, 18
Unlighted Aero Navigation Aids, 30
Unlighted Audio & Radio, Signs, Signals, Markers, Movable & Time Interval & Train Order Forms, 51
Unlighted Buoys, 18
Unlighted Fixed Forms, 51
Unlighted Signals, 15
Unlighted Visual Devices, 70
Unlighted Visual Markings, 18
Upper Quadrant Signals, 69
US Navy System, 59

VASI Systems, 55, 56, 73
VASIS, 56
Vehicular Exclusion: Weight, Height, & Length Forms, 42, 66
Visual Aero Aids, 72, 80
Visual Aids, 53, 54, 72, 78, 79, 80
Visual Aids to Navigation, 80
Visual & Lighted Terms, 72
Visual Markings, 18
VOR, 31, 58, 75
VOR, VHF Omnidirectional Radio Range, 58, 75
VOR, VORTAC, DME & TACAN Forms, 57, 58, 81
VOR/VORTAC-DME/TACAN, 58
VOR/VORTAC/DME/TACAN Aids, 75
VOR, TACAN, VORTAC & DME, 31
VOR, VOR/DME, VORTAC, TACAN, 81

WAAS & LAAS, 59, 76
Warning & Informative Signs, 22
Warning Signs, 22, 41, 64
Water & Air Transportation-Markings, 32
Wayside Signals, 46
Whistles, 39, 63
Whistle Buoys, 60
INDEX-GENERAL PREFACE

Classification, 6
Communication, 6
Culture, 6

Design, 6

History, 6
Holarchy, 6

Linguistics, 7

Messages, 7

Physical Apparatus, 7

Road Signs, 8

Safety Aids, 6, 7, 8
Semiology, 7
Semiotics, 6, 8
Signs, 7, 8
Sign Theory, 7
Symbols, 6, 7, 8

Technology, 6
Transportation, 6, 7, 8
Transport Mark, 7

Visual, Sound and Electronic Devices, 8

Waymarks, 7
INDEX-TOPICS

Acoustics, 11, 12
Aspects, 47, 67

Classification/Taxonomy, 10, 14, 15, 16, 17, 18, 19, 20, 21, 23, 25, 29, 30, 32, 33, 36, 71
Color, 10, 23, 26
Communication, 9, 12, 14
Culture, 11, 12

Design, 11, 12

Electronics, 10, 11, 96

History, 10, 11, 12, 17, 19, 20, 25, 29, 54, 55, 56, 58, 73, 74, 75, 78, 80, 81
Holarchy, 10

Light, 10, 17
Light Phase Characteristics, 37

Meanings, 26
Messages, 10, 11, 12, 14, 16, 18, 19, 23, 26, 27, 28, 30, 32, 35, 36, 41, 42, 43, 46, 47, 48, 54, 61, 67, 70, 79
Methodology, 18, 25, 29
Morphology, 35, 37, 38, 46, 47, 49, 50, 51, 55, 57, 60, 61, 62, 67, 68, 69, 70, 71, 72, 73

Nomenclature, 10, 14, 33

Physical Dimensions, 14, 25, 26, 29, 30, 35, 36, 38, 39, 44, 45, 46, 47, 48, 49, 54, 55, 56, 60, 62, 68, 72, 73, 74

Semiotics, 9, 14, 25, 29

103
Symbols, 9, 12, 49
Systems, 12, 17, 18, 19, 20, 23, 26, 31, 36, 39, 40, 44, 47, 48, 50, 55, 58, 59, 64, 67, 68, 73, 74, 75, 76, 80, 81

Technology, 12
Terminology, 11, 12, 13, 27, 29, 45, 46,
Transportation, 12, 13, 23, 32, 51
"We Communicate and Navigate with a code of Logos, Symbols, Emblems and Signs."

Susan Yelavich, *Design for Life: Our Daily Lives, the Space we Shape, and the Ways we Communicate, as seen through the collections of Cooper-Hewitt National Design Museum.* New York: Cooper-Hewitt, National Design Museum, Smithsonian Institution: Rizzoli 1997