

**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

*T-M Foundations*, 5th edition, 2008 (Part A, Volume I, First Studies in T-M) (2nd ed, 1991; 3rd ed, 1999, 4th ed, 2005)

*A First Study in T-M: The US*, 2nd ed, 1993 (Part B, Vol I)

*International Marine Aids to Navigation*, 2nd ed, 1988 (Parts C & D, Vol I)  
[3rd ed, In Process]

[Unified 1st Edition of Parts A-D, 1981, University Press of America]

*International Traffic Control Devices*, 2nd ed, 2004 (Part E, Vol II, Further Studies in T-M) (1st ed, 1984)

*International Railway Signals*, 1991 (Part F, Vol II)

*International Aero Navigation*, 1994 (Part G, Vol II)

*T-M General Classification*, 2nd ed, 2003 (Part H, Vol II)  
(1st ed, 1995, [3rd ed, Projected])

*Transportation-Markings Database:*

Marine, 2nd ed, 2007 (Part Ii, Vol III, Additional Studies in T-M)  
(1st ed, 1997)

TCD, 2nd ed, 2008 (Part Iii, Vol III) (1st ed, 1998)

Railway, 2nd ed, 2009 (Part Iiii, Vol III) (1st ed, 2000)

Aero, 2nd ed, 2009 (Part Iiv) (1st ed, 2001)

*Composite Categories Classification & Index*, 1st ed, 2006 (Part Iv, Vol III)  
(2nd ed, Projected)

*Transportation-Markings: A Historical Survey, 1750-2000*, 2002 (Part J, Vol IV, Final Studies in T-M)

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

*Transportation-Markings General Table of Contents with Index*, 7th ed, 2010  
(1st ed, 2002; 2nd edition, 2003; 3rd ed, 2004, 4th ed, 2005, 5th ed, 2006, 6th ed, 2008)

**T-M**

**TRANSPORTATION-MARKINGS**

**GENERAL TABLE OF CONTENTS**

**WITH INDEX**

Brian Clearman

Mount Angel Abbey

7th Edition

2010

Copyright (c) Mount Angel Abbey

1988, 1991, 1992  
1993, 1994, 1997,  
1998, 2000, 2001,  
2002, 2003, 2004,  
2005, 2006, 2007  
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 Nav aids; US T-M [an inter-modal and adjunct study]).

Database (Marine; Road; Rail; Aero; Composite Classification/Index).

Introductory 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* (Chartered 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] Mark [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 <i>Proceedings</i>	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

B Taxonomy & Holarchy: Expression of Singulars & Wholes & T-M	
1 Introduction	49
2 Nomenclature	52
3 Holarchy	54
Notes on Sources	56

## 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	101
2 Electronic Signal Configurations & Receivers: Multiple-Station at One Location with Single Message	103
3 Electronic Signal Configurations & Receivers: Multiple-Stations at One Location with Multiple-Messages	107
4 Electronic Signal Configurations & Receivers: Single Station -- Single & Multiple Messages	109

#### CHAPTER FOUR

##### ACOUSTICAL PROCESSES & ACOUSTICAL T-M

A Primer on Acoustical Processes	
1 Introduction & Terminology	112
2 Acoustical Processes	113
B Acoustical Signals Processes & Messages	
1 Types of Vibrating Instruments & Generating Sources	116
Note on Terminology	121
2 Messages & Impediments	122

#### CHAPTER FIVE

##### TRANSPORTATION-MARKINGS & DESIGN

A Design, Culture & T-M	
1 Introduction	125
2 Primer on Design	
a) Terminology	126
b) Elements & Principles of Design	131
c) T-M, Design & Culture	133
3 Capsule History of Design: Victorian Era to the Present	
a) Introduction and the Victorian Era	136

b) Late 19th Century & Earlier Twentieth Century	139
c) Design Since World War II	
1) Introduction	141
2) Minimalism & Functionalism	143
3) Cultural Icons	144
B External Factors Affecting T-M Design	
1 Introduction for 5B & 5C	149
2 The Historical Process	150
3 Science & Technology's Impact on T-M Materials & Design	153
C T-M & Design	
1 Interaction of T-M & Infrastructures with Design	
a) The Impact of Transportation Routeway on the Design of T-M Forms	156
b) Influence on T-Ms Internal Requirements on Design	158
c) Summary of Factors Affecting the Creating of T-M Characteristics & Design	161
2 T-M as a Reflection of Culture	
a) Historical Backdrop	163
b) T-M: A Reflection of its Times	166
3 Message Systems & Design: T-M as Communications	
a) Introduction & Terminology	170
b) Graphic, Geometric & Alphanumeric Symbols Design	172
c) Visual, Acoustical & Electronic Message Configurations	173

## APPENDIX: TERMINOLOGY FOUNDATIONS OF TRANSPORTATION-MARKINGS

i) Core Terms and Meanings	
1) 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

*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

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	

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] INTRODUCTION TO INTERNATIONAL MARINE AIDS TO NAVIGATION	1
---	---

CHAPTER TWO [Formerly Chapter 12] HISTORICAL SURVEY OF BUOYS & BUOYAGE SYSTEMS	
A Development of the Buoy & the Impact of Technology	
1 The Impact of the Industrial Revolution on Buoys	9
2 The Buoy and Its Development in the Nineteenth Century	11
B The Development of International Buoyage Systems	
1 International Buoyage Systems, 1846-1936	14
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] CLASSIFICATION OF BUOYAGE IN INTERNATIONAL USAGE	
A The Classification	35
B Notes on Classification of Buoys in International Usage	37
C Illustrated Classification	41

CHAPTER FOUR [Formerly Chapter 14] 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)

A Introduction, Terms, History	145
B A Classification of Daybeacons	148
C Description of Types of Beacons	150
D Message Systems	153

## CHAPTER NINE [Formerly Chapter 19] ELECTRONIC MARINE AIDS TO NAVIGATION

A Overview & History	170
B Classification and Explanatory Notes	173
C Description of Types of Message Systems: Hyperbolic Systems	176
D Description of Types of Message Systems: Radio & Radar	182
E Miscellaneous Navigation & Non-navigation Systems	186

## CHAPTER TEN [Formerly Chapter 20] FOG SIGNALS

A Introduction & Classification with Explanatory Notes	
1 Introduction	195
2 Classification with Explanatory Notes	197
B Types of Fog Signals & Message Systems	198

## APPENDICES

I Selected Topmark Patterns	205
II A Unified Classification of Marine Transportation-Markings	209

BIBLIOGRAPHY	215
--------------	-----

INDEX	223
-------	-----

## *INTERNATIONAL TRAFFIC CONTROL DEVICES*

PREFACE	10
---------	----

### 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 Preceding 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	
a) Changes in Drafts	116
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

## BIBLIOGRAPHY

i	Abbreviations for Sources	217
ii	Books, Journals & Reports (Non-Governmental 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 Introduction	1
2 Physical Properties	2
3 Semiotics of the Signal	6
B Aspects of the History of the Railway Signal	
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	
1 Introduction	33
2 Classification of Signals	35
3 Explanatory Notes	38
B Variant Classification	
1 Introduction	47
2 Shape Configuration of Signals	49
3 Illustrations	66

4 Explanatory Notes	78
---------------------	----

### 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

## 5 Messages for Graphic, Geometric & Alphanumeric Signals

### 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:

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

*INTERNATIONAL AERONAUTICAL TRANSPORTATION-MARKINGS*  
[ALTERNATE TITLE: *INTERNATIONAL AERO NAVIGATION AIDS*]

PREFACE	vii
ACKNOWLEDGEMENTS	viii
ABBREVIATIONS	x

CHAPTER ONE [Formerly Chapter 33]  
AERONAUTICAL NAVIGATION AIDS: INTRODUCTION &  
EARLY DEVELOPMENTS

A Introduction	
1 Terminology, The Nature of Aero T-Ms & Methodological Concerns	1
2 Aero Nav Aids: Physical Properties & Semiotics	9
B History of Aero Nav Aids	
1 Introduction & Early Aviation Developments	16
2 Early History of Aero Aids, 1919-1937	20
3 Development of Aero Aids, 1938-1943	32
4 Final Developments Before ICAO, 1944-1950	37

CHAPTER TWO [Formerly Chapter 34]  
THE CLASSIFICATION

A Main Classification	
1 Introduction	49
2 Main Classification	51
3 Explanatory Notes	54
B Variant Classification	
1 Classification	60
2 Explanatory Notes	63
C Pictorial Representations	
1 Illustrations	72
2 Explanatory Notes	78

## 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	7
------------------------------------	---

### 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

## 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	
a) Narrower Forms	140
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 Miscellaney	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/Flashing Light	163
d) Isophase Characteristics	166
e) Occulting/Occulting 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	
a) Overarching & Sub-Overarching Terms	27
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	

a) Introductory Note & Overarching Terms	85
b) Message Configurations	88
2 Roadway Alignment Signs	
a) Introductory Note & Overarching Terms	89
b) Specific Terms	91
3 Roadway Condition Signs	
a) Introductory Statements & Overarching terms	94
b) Specific Terms	95
4 Intersection Signs	
a) Introductory Note, & Overarching Terms	102
b) Specific Terms	103
5 Intermittent Moving Hazards Signs	106
6 Construction & Maintenance Signs	114
7 Other Hazards Signs	
a) General or Alternate Danger Signs	117
b) Miscellaneous Forms	119
c) Supplemental Plates/Plaques	123

### CHAPTER THREE REGULATORY SIGNS

A Indexes	
1 Categories	126
2 Alphabetical	134
B Regulatory Signs	
1 Introduction, Overarching/Sub-Overarching Terms & Messages	
a) General Note	145
b) Overarching and Sub-Overarching Terms	145
c) Messages	146
2 Priority Signs	148
3 Prohibitory & Restrictive Signs	
a) Prohibitory & Restrictive of Entry Sign	
1) One-Way & Both Direction Forms	151
2) Exclusion Categories of Vehicles Forms	152
3) Vehicular Exclusion: Weight, Height & Length Forms	154

4) Miscellaneous & Single Forms	155
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	221
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

APPENDIX II: TERMS FOR TRAFFIC CONTROL DEVICES	281
BIBLIOGRAPHY	285

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

PREFACE	12
ABBREVIATIONS	15
CHAPTER ONE	
GENERAL RAILWAY SIGNAL TERMS	
A Indexes	
1 Categories	17
2 Alphabetical	41
B General Railway Signal Terms	
1 Overarching Terms	
a) Signal Terms	63
b) Fixed/Lineside/Railway-Railroad/Wayside Signal Terms	65
c) Other Overarching Terms	69
2 Possibly/Partial Overarching Terms	
a) Energy & Technology-Related Terms	72
b) Physical-Morphological Overlapping Terms	75
c) Possible Overarching Terms-Miscellaneous	76
3 Primary Overarching Terms in Other Languages	78
4 Signal Components	82
5 Signal Confirmation	86
C Messages: Aspects & Indicators	
1 Basic Terms & Colors	
a) Terms	88
b) Colors	
1) Basic Colors	89
2) Color Combinations	90

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	191
2) Limited-Variant Forms	192
3) Variant Forms	193
4) Signalling Forms	195
b) Other Color Light Signal Forms	
1) Distance Forms	196
2) Lens Arrangement Forms	197
3) Morphology & Other Forms	197
3 Searchlight Signal Forms	201
4 Other All-Lighted Terms	
a) Single Lens Units [Frequently Morphological Dimension]	
1) Terms Slightly More Morphological Than Physical	205
2) Somewhat More Morphological Than Physical	206
b) Dwarf Signals [Frequently Multiple Lens]	206
c) Undifferentiated Physical Forms	207
C Position Light, Color-Position Light & Symbolic Forms	
1 Position Light Signal Terms	211
2 Color-Position Light Signal Terms	216
3 Symbolic Forms	
a) Multi-Lamp Theatre Indicators	218
b) Stencil Indicators	219
c) Other Forms	220
D Cab Signalling	
1 Major Cab Signal Forms	221
2 Forms (Operational) of Cab Signals	224
3 Partly Morphological Terms	226
4 Other Cab Signal Forms	227
5 Cab Signal with Sound Dimensions	228

### 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

3) Terms Related to Railroad Functions	375
c) Other Terms	375
d) Switch Stand Terms	376
C Acoustical & Radio Signals	
1 Acoustical Signal Terms	
a) Overarching Terms	378
b) Explosive Signals	378
c) Level Crossing/Grade Crossing Sound Signals	382
d) Cab Signal & Train Control Sound Signals	386
e) Other Forms	388
2 Radio Signal Terms	389
D Staff, Ticket, Token, Tablet, Train Order & Time Interval Terms	
1 Staff Forms	393
2 Staff & Ticket Forms	397
3 Token Forms	399
4 Tablet & Tablet & Token Forms	400
5 Tokenless Forms	406
6 Train Order Forms	407
7 Time Interval Forms	411
8 Other Forms	412
E Level/Grade Crossing Signs, Signals, Markers & Other Forms	
General Note	414
1 Integrative Level Crossing & Grade Crossing Terms	414
2 Lighted Level Crossing & Grade Crossing Signals	
a) Free-Standing Signals	418
b) Signals Attached to Other Devices	422
3 Barriers & Gates	
General Note	423
a) Overarching Terms	423
b) Barriers, Full Barriers & Gates	
1) Automatic Barriers	423
2) "Manned" & Manually Operated Barriers	
c) Half Barriers & Gates	426

4 Sound Signals	428
5 Signs & Boards	429
7 Other Forms	432

## BIBLIOGRAPHY

i Books, Journals, Letters, Reports	434
ii Trade Literature	448
iii Signal Code Materials	432

*TRANSPORTATION-MARKINGS DATABASE:  
AERONAUTICAL NAVIGATION AIDS*

PREFACE	11
ABBREVIATIONS	12
CHAPTER ONE AERONAUTICAL LIGHTED AIDS	
A Indexes	
1 Categories Index	16
2 Alphabetical	47
B Overarching Terms: General & Visual Terms	
1 General Terms for all Aeronautical Terms	
a) Primary Terms	76
b) Specialized Terms	78
2 Visual Aids Terms	82
3 Sub-Overarching Terms	88
4 Overarching Terms for Lighted Aero Navigation Aids	
a) Light & Lighting Aids Terms	86
b) Airfield & Airport Light/Lighting Terms	87
5 Color & Other Messages	
a) Colors	
1) Single Colors	93
2) Color Combinations	96
b) Historic Uses	96
c) Contemporary Usages	97
C Beacons & Obstruction Lighting	
1 Overarching Terms	100
2 Physical Apparatus	
a) Method of Operation-Related Terms	102
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	
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	
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	
a) Overarching Terms	151

b) Precision Approach Path Indicators	153
c) VASI Systems	
1) Forms	156
2) VASIS: Types	158
d) Other Final Approach & Miscellaneous Forms	
1) Glide Path Forms	159
2) Tri-Color Forms	161
3) Fresnel Forms	161
4) PLASI Forms	162
5) Miscellaneous Forms	163
E Runway & Taxiway Lighting	
1 Runway Lighting	
a) Overarching Terms	166
b) Runway Edge Lights	168
c) Runway Centerline Lights	169
d) Threshold, Touchdown Zone, Runway End & Other Lights	171
e) Runway Equipment Terms	
1) General Terms	174
2) Physical Apparatus	175
3) Terms by Intensity	179
2 Taxiway Lighting	
a) Overarching Terms	182
b) Taxiway Edge Lighting	184
c) Taxiway Centerline Lighting	184
d) Physical Apparatus & Other Terms	
1) Physical Apparatus	186
2) Other Terms	188
3 Historic & Composite Terms	
a) Historic Terms: Boundary, Contact & Range Lights	190
b) Composite Terms	191

## 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 & Miscellaney	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	Alphabetical 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

b) Loran	387
c) Decca	390
d) Consol	391
e) Omega	392
f) Miscellaneous Hyperbolic Aid Forms	393
4 Satellite Navaids	
a) GPS	395
1) Main Terms	396
2) Specialized & Composite Terms	397
3) NAVSTAR GPS	398
4) GLONASS	399
b) Augmentation Terms	
1) DGPS	400
2) WAAS & LAAS Augmentation Terms	402
3) Other Augmentation Terms	404
c) GNSS	405
d) Other Satellite Navigational Terms	
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 Miscellany	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	31
c) Buoy Names From Messages	31
d) Names from Indirect Navigation Uses Forms	32
1) Station Buoys	
2) Towing Buoys	
3) Anchor, Anchorage & Mooring Buoys	
e) Special Purpose Buoys	33
f) Miscellaneous Buoys	33
3 Excerpts from Buoy Adjunct Terms	33
4 Major Floating Aids Terms	34
a) Overarching Terms	
b) Lightship & Light Vessels	
c) Light Floats	
d) Large Navigational Buoys	
Notes: New Terms & Differences in Studies	35
B Fixed Visual Aids	
1 Fixed Lights	40
a) Overarching Terms	
1) General Overarching Terms	
2) Overarching Terms for Major Lights	
3) Overarching Terms for Minor Lights	
b) Major Lights	42
1) Subdivisions	
2) Major Light-Individual Entries	
c) Minor Lights	44
1) Single-Member Structures	
(a) Narrower Types	
(b) Wider Types	
2) Multiple-Member Structures	
3) Enclosed/Composite/Single Structures	
d) Morphological Terms	45
1) Major Lights	

2) Minor Lights	
e) Character of Operations Terms	47
1) Nature of Operations	
2) Specific Character of Light Operations	
f) Miscellaney	47
g) General Character of Lights	48
Notes: Major Lights: New Terms & Differences in Studies	48
Notes: Minor Lights: Differences in Studies	50
2 Daybeacons	
a) Overarching Terms	52
1) Basic Terms	
2) Shared & Foreign Language Terms	
b) Morphological Daybeacons	52
1) Leading/Range Marks	
2) Signals	
3) Other Morphology Terms	
c) Physical Daybeacon Forms	53
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	56
C Acoustical & Radio Aids	
1 Acoustical Aids	
a) Fog Signal Overarching Terms	59
b) Diaphone, Diaphragm, Reed, & Siren Signals	60
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	63
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	66
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

1) Overarching & Other Terms	
2) GPS	
3) Navy Transit Satellite Navigation Systems	
4) Other Satellite Systems	
1) Other Radio Aids	78
1) Radio/Sound Aids	
2) Miscellaneous Aids	
Notes: New Terms & Differences in Studies	79

## CHAPTER TWO TRAFFIC CONTROL DEVICES

A Light & Sound Signals	
1 Traffic Control Signals	83
a) Overarching Terms & General Note	
b) Specific Entries	
c) Traffic Signal Operation	
2 Pedestrian Signals	84
3 Traffic Signals-Other Types	84
4 Flashing Beacons	84
a) Overarching Terms	
b) Specific Entries	
c) Lighting Device	
5 Grade/Crossing/Level Crossing Signals	85
6 Sound Traffic Signals	86
Notes: New Terms & Differences in Studies	86
B Warning Signs	
1 Categories & Overarching Terms	91
a) Categories	
b) Overarching Terms	
2 Roadway Alignment Signs	91
a) Introductory Note & Overarching Terms	
b) Specific Signs	
3 Roadway Condition Signs	
a) Introductory Note & General Terms	92

b) Specific Signs	92
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	

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

Notes: New Terms & Differences in Studies	141
---	-----

## CHAPTER THREE RAILWAY SIGNALS, SIGNS, MARKERS

### A General Railway Signal Terms

#### 1 Overarching Terms

a) Signals	148
b) Fixed/Lineside/Railway-Railroad/Wayside Signals	148
c) Other Overarching Terms	149
d) Possible/Partial Overarching Terms	150
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	151
1) Color	
2) Aspects	
3) Indications	
b) Morphology	152
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	157
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	159
B Fully & Partially-Lighted Signals	
1 Overarching Terms	162
2 Color Light Signals	
a) Principal Signal Types	162
1) Basic	
2) Limited-Variant	
3) Variant	
4) Signaling	
b) Other Color Light Signals	162
1) Distance Signals	
2) Lens Arrangement Terms	
3) Morphology & Other Terms	
3 Searchlight Signals	164
4 Other All-Lighted Signals	
a) Single Lens Units: Morphological Dimension Frequently Present	165
1) Signal Terms Slightly More Morphological Than Physical	
2) Signal Terms Somewhat More Morphological Than Physical	
b) Dwarf Signals [Frequently Multiple Lens]	165
c) Undifferentiated Physical Signals	166
5 Position Light, Color Position Light, & Alphanumeric, Graphic & Geometric Signals	
a) Position Light Signals	166
b) Color Position Light Signals	

167		
	c) Symbolic Signal Types	167
	General Note	
	1) Multi-Lamp/Theatre Indicators	
	2) Stencil Indicator	
	3) Other Indicators	
	6 Cab Signals	
	a) Major Cab Signal Types	168
	b) Operational Terms-Cab Signals	168
	c) Partly Morphological Terms	169
	d) Other Cab Signals	169
	e) Cab Signals with Sound Dimension [Primarily Acoustical Signal segment]	170
	7 Partially-Lighted Signals: Semaphores	
	a) Overarching Terms	170
	b) Types of Semaphores	170
	1) Lower Quadrant & Upper Quadrant Signals	
	2) Somersault Signals	
	c) Semaphores: Methods of Operation	171
	d) Semaphores: Morphologically-Related Terms	172
	e) Semaphores: System-Related Terms	173
	f) Other Semaphores Terms	174
	8 Partially-Lighted Signals: Signal Boards, Disc Signals & Other Forms	
	a) Signal Boards	175
	1) Overarching Terms & Terms in Other Languages	
	2) Specific Board Terms	
	b) Disc Signals	175
	General Note	
	1) Disc Signals Containing the Word Disc	
	2) Banner Signals (Exposed Disc Form Under then Banner Name)	
	c) Morphological-related Terms	177
	General Note	
	1) Switch Signals	

3) Route Indicators	
4) Other Morphological Signal Terms	
d) Other Signals	178
1) Crossbar Signals	
2) Flag Signals	
3) Lighted Signs & Boards	
4) Track Indicators	
5) Miscellaneous Signals	
Notes: New Terms & Differences in Studies	179
C Unlighted Visual Devices	
1 Unlighted Fixed Types with Constant Message	
General Note	187
a) Location Signs	187
b) Transportation Signs	187
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	190
d) Safety Signs	190
e) Marks & Markers	190
f) Boards & Posts	192
g) Plates & Flags	194
h) Other Devices	194
1) Overarching Terms	
2) Blue Flags	
3) Electric Traction Signs	
4) Miscellaneous Signs	
2 Targets	
General Note	195

a) Overarching Terms	195
b) Morphological-Related Terms	195
General Note	
1) Shape Targets	
2) Color & Position Targets	
3) Terms Relating to Railroad Functions	
c) Other Targets	196
d) Switch Stands	196
Note: Signs: New Terms & Differences in Studies Including the Problems of Correlating Classifications & Database	197
D Acoustical & Radio Signals	
1 Acoustical Signal Terms	
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	
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 & Other Devices	
General Note	207
1 Integrative Level Crossing/Grade Crossing Signals	
2 Lighted Level Crossing/Grade Signal Crossing Signals	208
3 Barriers & Gates	
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	
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	
1 General Terms for All Aero Navigation Aids	
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	
a) Light & Lighting Aids Terms	222
b) Airfield & Airport Light/Lighting Terms	222
B Beacons & Obstruction Lighting	
General Note	223
1 Overarching Terms	223
2 Physical Apparatus	
a) Method of Operation-Related Terms	224
b) Dimension-Related Terms	224
c) Energy Source-Related Terms	225
3 Morphological Terms	
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) Slopedline 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	

2) Operational Types	
d) Other Types	240
1) Glide Path	
2) Tri-Color	
3) Fresnel	
4) PLASI	
5) Miscellaneous Systems	
D Runway & Taxiway Lighting	
1 Runway Lighting	
a) Overarching Terms	241
b) Runway Edge Lights	241
c) Runway Centerline Lights	241
d) Threshold, Touchdown Zone, Runway End & Other Lights	242
e) Runway Equipment Terms	243
1) General Terms	
2) Physical Apparatus	
3) Light Equipment By Intensity	
2 Taxiway Lighting	
a) Overarching Terms	246
b) Taxiway Edge Lighting	246
c) Taxiway Centerline Lighting	246
d) Physical Apparatus & Other Terms	246
1) Physical Apparatus	
2) Other Taxiway Lights	
3 Historic & Composite Terms	
a) Historic Terms: Boundary, Contact & Range Lights	248
b) Composite Terms	248
Notes: New Terms & Differences in Studies	248
E Radio Aids	
1 Overarching Terms	
a) General Terms	255
b) Sub-Overarching Terms	256
c) Special Terms	256
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	
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 Nav aids	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 & Miscellaney	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

*TRANSPORTATION-MARKINGS: A HISTORICAL  
SURVEY, 1750-2000*

PREFACE	9
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
2	Traffic Control Devices: New Directions & Changes, 1952-1968	
	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

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.”

W. Stanley Jevons, *The Principles of Science: A Treatise on Logic and Scientific Method*. (Chapter XXX, Classification).

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,

Arms, Boards, & Tablets, 79  
 Automatic Barriers, 52  
 Automatic Block System, 48  
 Automatic Block Signal Systems, 68  
  
 Banner Signals, 50, 69  
 Barrels & Cask Buoys, 35, 60  
 Barricades & Channelizing Devices, 44, 66  
 Barriers & Gates, 52, 71  
 Barriers, Full Barriers & Gates, 52, 71  
 Beacons, 13, 30, 55, 59, 73, 76, 81  
 Beacons & Multi-Mode Radio Aids, 31  
 Beacons & Obstruction Lighting & Lights, 30, 54, 72,  
 Bell Buoys, 60  
 Bells, 39  
 Block Signals, 68  
 Block Systems, 48  
 Block Terms, 48  
 Blue Flags, 51, 70  
 Boards & Posts, 51, 70  
 Boundary, Contracts, & Range Lights, 56, 74  
 Bouyage, 17, 18  
 Buoyage & Beaconage Systems, 80  
 Buoyage Systems, 17, 18, 80  
 Buoys, 17, 18, 36, 35, 60, 61, 79  
 Buoys & Buoyage Systems, 17  
 Buoys & Other Floating Aids, 60  
  
 Cab Signalling, 49  
 Cab Signals, 26, 49  
 Cab Signals/Cab-Signal, Related Signals, 26, 69, 81, 82  
 Cab Signals & Related Signals, 82  
 Cab Signal & Train Control Sound Signals, 52, 71

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

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/Obstruction, 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  
ILS, 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  
 Slope line 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

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

Symbolic Signals, 69

Tablets, 52

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 Nav aids/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 Marks, 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

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

**978-0-918941-32-9**