dandelon.com
© 2008 AGI-Information Management Consultants
May be used for personal purposes only or by
libraries associated to dandelon.com network.

Manual of Offshore Surveying for Geoscientists and Engineers

R.P. LOWETH

CHAPMAN & HALL
London · Weinheim · New York · Tokyo · Melbourne · Madras

Contents

List of figures	ix
List of tables	xiii
Foreword	xv
1 Introduction	1
1.1 Sextants to satellites	2
1.2 2D and 3D marine seismic surveying	3
2 Datums and projections	5
2.1 Geodetic nomenclature	6
2.2 Reference systems	7
2.3 Projections	10
2.4 The Australian Map Grid (AMG)	15
2.5 World Geodetic System 84 (WGS84)	22
2.6 Transverse projection formulae	24
3 Accuracy	31
3.1 The measurement process	32
3.2 Statistical terms	35
3.3 Absolute accuracy	38
3.4 Relative accuracy	43
3.5 Propagation of variance	46
3.6 Summary	49
4 Introduction to computations	51
4.1 Introduction	52
4.2 Coordinate systems	52
4.3 Least squares	57
4.4 Streamer and source shaping	67
4.5 Summary	70
5 Kalman filters	71
5.1 Introduction	72
5.2 A typical filter — overview	78
5.3 Observation equations	82
5.4 Weighting	87
5.5 Transition function	89
5.6 Data rejection	90
5.7 Residuals and statistics	91
5.8 Group computations	92

5.9 Summary 92

6 Radio positioning systems 95
6.1 Introduction 96
6.2 Pulse/8-II 97
6.3 Argo 100
6.4 Hyperfix 105
6.5 Geoloc 108
6.6 Micro-Fix 110
6.7 Syledis 115

7 GPS 123
7.1 Introduction 124
7.2 Observational concepts 124
7.3 Selective availability 133
7.4 Some terms explained 134
7.5 Operational considerations 137
7.6 DGPS — introduction 138
7.7 Basic operation 138
7.8 Error sources 143
7.9 Data formats 146
7.10 The SkyFix system 148

8 Lasers, acoustics and compasses 157
8.1 Introduction 158
8.2 Lasers 158
8.3 Acoustics 165
8.4 Compasses 173

9 High-resolution survey 179
9.1 Introduction 180
9.2 Tides 180
9.3 Echo-sounders and pingers 190
9.4 Sonar 194
9.5 Digital equipment 195
9.6 Acoustic systems 196

10 Calibration 199
10.1 Introduction 200
10.2 Syledis 201
10.3 Argo 213
10.4 DGPS 217
10.5 Tailbuoys 219
10.6 Gyro 221
10.7 Relative systems 222

11 Planning the network 223
11.1 Introduction 224
11.2 The problem 226
11.3 The solution 228

12 Processing and quality control 237
12.1 Introduction 238
12.2 New computer technology 239
12.3 Quality control 242
12.4 Integrated quality control 246

13 Binning systems 251
13.1 Introduction 252
13.2 Binning problems 254
13.3 Specific requirements 256
13.4 Attribute analysis 258

14 Typical specifications 261
14.1 System specification 262
14.2 Guidelines for representatives in seismic operations 267
14.3 Positioning systems — acoustic (long, short baseline) 280
14.4 Streamer and source positioning for 3D seismic surveys 284

Appendix A UKOOA P1/90 289
A.1 General 290
A.2 Tape specification 290
A.3 Header record specification 292
A.4 Data record specification 298
A.5 Example header and data file 302

Appendix B UKOOA P2/91 303
B.1 Introduction 304
B.2 Logical file structure 304
B.3 Storage media and physical file specification 307
B.4 General rules 308
B.5 Summary of record codes 308
B.6 Description of header records 312
B.7 Event data records (implicit time tag) 362
B.8 Example P2/91 header and data 377

Glossary 395

Bibliography 421

Index 423