

Table of Contents

1.0 Dead Reckoning and the Log	1
2.0 Marlinespike Seamanship	7
3.0 The Magnetic Compass	21
4.0 Fixed Aids to Navigation	29
5.0 Floating Aids to Navigation	39
6.0 Bearings and Fixes	47
7.0 Relative Bearings	55
8.0 Distance of an Object by two Relative Bearings	59
9.0 Collision Regulations	65
10.0 Tides and Currents	77
11.0 Weather	89
12.0 Wind, Waves and Current	95
13.0 Seamanship Skills for Adverse Weather	99
14.0 Buoyancy and Stability	105
15.0 Medical Emergencies	113
16.0 Emergencies at Sea	119
17.0 Anchors and Anchoring	137
Appendix A	I

Detailed Table of Contents

Introduction

Course Material

Standards of Accuracy for Chartwork

Section 1.0 Dead Reckoning and the Log

- 1.1 Learning Objectives
- 1.2 Dead Reckoning
- 1.3 Dead Reckoning Plot (DR Plot)
 - 1.3.1 Taking Departure
 - 1.3.2 The Course Line
 - 1.3.3 DR Positions
- 1.4 Navigator's Notebooks
 - 1.4.1 The Working Notebook
 - 1.4.2 The Navigator's Personal Reference Notebook
- 1.5 Keeping a Deck Log
 - 1.5.1 General
 - 1.5.2 Information Required for a Deck Log

Section 2.0 Marlinespike Seamanship

- 2.1 Learning Objectives
- 2.2 General
- 2.3 The Practical Component
- 2.4 Lines aboard the Boat
 - 2.4.1 Types of Line
 - 2.4.2 Purpose
 - 2.4.3 Size
 - 2.4.4 Strength
- 2.5 Purchasing Tips
 - 2.5.1 Mooring Lines
 - 2.5.2 Anchor Rode
 - 2.5.3 Other Considerations
- 2.6 Storage and Stowage
- 2.7 Block and Tackle
 - 2.7.1 Blocks
 - 2.7.2 Tackles
- 2.8 Whipping
 - 2.8.1 Common Whipping
 - 2.8.2 West Country Whipping
 - 2.8.3 Sailmaker's Whipping
- 2.9 Knots, Hitches and Bends
 - 2.9.1 Review

- 2.9.2 New Knots, Hitches and Bends
- 2.10 Splices
 - 2.10.1 Eye Splice
 - 2.10.2 Short Splice

Section 3.0 The Magnetic Compass

- 3.1 Learning Objectives
- 3.2 General
- 3.3 Earth's Magnetic Field
 - 3.3.1 True Directions
 - 3.3.2 The Magnetic Poles
 - 3.3.3 Variation
- 3.4 Deviation
 - 3.4.1 Causes
 - 3.4.2 Effect of the Boat's Magnetic Field on the Compass
- 3.5 Compass Installation
 - 3.5.1 Location
 - 3.5.2 Slew of the Compass
 - 3.5.3 Mounting
- 3.6 Removing Gross Deviation (Compensating the Compass)
- 3.7 Determining Deviation
 - 3.7.1 Procedure
- 3.8 The Practice Deviation Table
- 3.9 Using the Deviation Table
- 3.10 Compass Maintenance
- 3.11 Fluxgate Compasses
- 3.12 Gyroscopic Compasses

Section 4.0 Fixed Aids to Navigation

- 4.1 Learning Objectives
- 4.2 General
 - 4.2.1 Aids to Navigation
- 4.3 Symbols, Abbreviations and Terms-Chart #1
 - 4.3.1 The Canadian Aids to Navigation System
- 4.4 Fixed Aids
 - 4.4.1 Light Stations
 - 4.4.2 Government Publications
 - 4.4.3 Interpreting Charted Descriptions
 - 4.4.4 Emergency Lights
 - 4.4.5 Minor Lighted Aids
 - 4.4.6 Sector Lights
 - 4.4.7 Oscillating Boundary
 - 4.4.8 Ranges

- 4.4.9 Daybeacons
- 4.4.10 Fog Signals
- 4.5 Visible Range
 - 4.5.1 Intervening Objects
 - 4.5.2 Strength of the Light (Nominal Range)
 - 4.5.3 Geographic Range
- 4.6 Government Publications
 - 4.6.1 Notices to Mariners
 - 4.6.2 Light Characteristics

Section 5.0 Floating Aids to Navigation

- 5.1 Learning Objectives
- 5.2 General
- 5.3 Cardinal and Lateral Buoys
 - 5.3.1 Cardinal Buoys
 - 5.3.2 Lateral Buoys
- 5.4 Buoy Recognition
 - 5.4.1 Shape
 - 5.4.2 Colour
 - 5.4.3 Numbering
 - 5.4.4 Lights
 - 5.4.5 Sound Apparatus
 - 5.4.6 Reflectors
- 5.5 Aids to Navigation Protection Regulations
- 5.6 Buoys and Positioning
- 5.7 New Dangers

Section 6.0 Bearings and Fixes

- 6.1 Learning Objectives
- 6.2 Bearings
 - 6.2.1 Lines of Position
 - 6.2.2 Ranges
- 6.3 Taking Bearings
 - 6.3.1 Choosing the Objects
 - 6.3.2 Record Observations in the Navigator's Notebook
- 6.4 Magnetic Bearings
- 6.5 Compass Bearings
 - 6.5.1 To Correct Compass Bearings
- 6.6 Turning Bearings
 - 6.6.1 Bearing on a Charted Object
 - 6.6.2 A Range as a Turning Bearing
 - 6.6.3 Entering Harbour
- 6.7 The Fix

- 6.7.1 Areas of Uncertainty
- 6.7.2 Three-bearing Fix

Section 7.0 Relative Bearings

- 7.1 Learning Objectives
- 7.2 Evolution of Bearings
- 7.3 Stating Relative Directions
 - 7.3.1 The 360° Form
 - 7.3.2 The 180° Port or Starboard Form
- 7.4 Converting Relative Bearings
 - 7.4.1 Examples
- 7.5 To Obtain Relative Bearings
 - 7.5.1 Using a Hand Bearing Compass
 - 7.5.2 Using a Pelorus
 - 7.5.3 Tape Marks

Section 8.0 Distance of an Object by Two Relative Bearings

- 8.1 learning Objectives
- 8.2 Distance
 - 8.2.1 Relative Bearings as “Differences from Heading”
- 8.3 Doubling the Angle on the Bow
 - 8.3.1 The Method
 - 8.3.2 The Theory
 - 8.3.3 Practical Aspects
- 8.4 To Determine a Future Distance Away
- 8.5 Circle of Position
- 8.6 Bow and Beam Bearings
 - 8.6.1 Procedure
 - 8.6.2 Plotting the Bow and Beam Bearing
 - 8.6.3 Accuracy

Section 9.0 Collision Regulations

- 9.1 Learning Objectives
- 9.2 Introduction
- 9.3 Part A, General
- 9.4 Part B, Section 1, Steering and Sailing Rules
 - 9.4.1 Rule 4
 - 9.4.2 Rule 5
 - 9.4.3 Rule 6
 - 9.4.4 Rule 7
 - 9.4.5 Rule 8
- 9.5 Part B, Section II, Steering and Sailing Rules
 - 9.5.1 Rule 13

- 9.5.2 Rule 14
- 9.5.3 Rule 15
- 9.5.4 Rule 9
- 9.5.5 Rule 10
- 9.5.6 Rule 12
- 9.5.7 Rule 18
- 9.6 Part B, Section III, Conduct of Vessels in Restricted Visibility
 - 9.6.1 Rule 19
- 9.7 Part C, Lights and Shapes
 - 9.7.1 Rule 20
 - 9.7.2 Rule 21
 - 9.7.3 Rules 23 and 25
 - 9.7.4 Rule 24
 - 9.7.5 Rule 26
 - 9.7.6 Rule 27
 - 9.7.7 Rule 30
- 9.8 Part D Sound and Light Signals
 - 9.8.1 Rule 33
 - 9.8.2 Rule 34
 - 9.8.3 Rule 35
 - 9.8.4 Rule 37
- 9.9 Part F, Additional Canadian Provisions
 - 9.9.1 Rule 45

Section 10 Tides

- 10.1 Learning Objectives
- 10.2 General
- 10.3 Forces that Cause the Tides
- 10.4 Classification of Tides
 - 10.4.1 Semi-diurnal Tides
 - 10.4.2 Diurnal Inequality
 - 10.4.3 Diurnal Tides
 - 10.4.4 Mixed Tides
- 10.5 Sources of Information
 - 10.5.1 The Tide Tables
 - 10.5.2 Other Sources of Information
- 10.6 Datum Measurements and Tides
- 10.7 Practical Applications
 - 10.7.1 To Determine the Height of Tide
 - 10.7.2 To Determine Clearance
- 10.8 Tidal Currents
 - 10.8.1 General
 - 10.8.2 Current Basics

- 10.8.3 Causes of Tidal Currents
- 10.8.4 Terminology
- 10.9 Sources of Current Information
 - 10.9.1 The Chart
 - 10.9.2 Tide and Current Tables
 - 10.9.3 Local Knowledge
- 10.10 Using Current Tables
 - 10.10.1 To Interpret Data for a Particular Day
- 10.11 Practical Considerations
 - 10.11.1 Before Cruising in Tidal Waters
 - 10.11.2 Some Rules of Thumb
 - 10.11.3 Effects of Weather
- 10.12 Additional Current Terms

Section 11.0 Weather

- 11.1 Learning Objectives
- 11.2 General
- 11.3 Weather Forecasts
- 11.4 Atmospheric Conditions that Cause Weather
 - 11.4.1 Pressure
 - 11.4.2 Temperature
 - 11.4.3 Humidity
 - 11.4.4 Atmospheric Motion
- 11.5 Centres of Low Pressure
 - 11.5.1 Buys-Ballot's Law
- 11.6 Fronts
 - 11.6.1 Warm Front
 - 11.6.2 Cold Front
- 11.7 Forecasting
 - 11.7.1 Clues to Watch For
 - 11.7.2 Warm Front Pattern
 - 11.7.3 Cold Front Pattern
 - 11.7.4 Signs of Improving Weather Conditions
- 11.8 Fog
 - 11.8.1 General
 - 11.8.2 Radiation Fog
 - 11.8.3 Advection Fog or Sea Fog
 - 11.8.4 Frontal Fog or Warm Front Fog

Section 12.0 Winds, Waves and Current

- 12.1 Learning Objectives
- 12.2 General
- 12.3 Wind

- 12.3.1 Wind Strength
- 12.3.2 The Effects of Wind
- 12.4 Waves
 - 12.4.1 Wave Generation
 - 12.4.2 Breaking Waves
 - 12.4.3 Features of Wave Behavior
 - 12.4.4 Practical Considerations
- 12.5 Currents
 - 12.5.1 Types of Current

Section 13.0 Seamanship Skills for Adverse Weather

- 13.1 Learning Objectives
- 13.2 Thunderstorms
 - 13.2.1 General
 - 13.2.2 The Seamanship
- 13.3 Squalls and Squall Lines
 - 13.3.1 General
 - 13.3.2 Seamanship Squall Tactics
- 13.4 Fog
 - 13.4.1 General
 - 13.4.2 Seamanship in Fog
 - 13.4.3 Strategies
- 13.5 Storms
 - 13.5.1 General
 - 13.5.2 Choices
 - 13.5.3 Prepare the Crew
 - 13.5.4 Prepare the Boat
 - 13.5.5 Navigation
- 13.6 Seamanship Skills for Heavy Weather
 - 13.6.1 Away from Shore
 - 13.6.2 Steering Technique in a Beam Sea
 - 13.6.3 Steering Technique in a Following Sea
 - 13.6.4 Inlets and Estuaries
 - 13.6.5 Heaving-to

Section 14.0 Buoyancy and Stability

- 14.1 Learning Objectives
- 14.2 The Force of Gravity
 - 14.2.1 Definitions
 - 14.2.2 The Centre of Gravity
 - 14.2.3 Practical Considerations
- 14.3 The Force of Buoyancy
 - 14.3.1 Theory of Buoyancy

- 14.3.2 Practical Considerations
- 14.3.3 Centre of Buoyancy
- 14.4 Stability
 - 14.4.1 Definitions
 - 14.4.2 Positive and Negative Stability
- 14.5 Inter-relationship of Centre of Gravity and Centre of Buoyancy
- 14.6 The Effect of Bilge Water on Stability
- 14.7 Pitching
- 14.8 Retaining or Increasing Stability
- 14.9 Stability and Design Alterations
- 14.10 Stability in Relationship to Towing
- 14.11. Formula for Calculating Hull Speed for Stability

Section 15.0 Medical Emergencies

- 15.1 Learning Objectives
- 15.2 General
- 15.3 The First Aid Kit
- 15.4 The Standard First Aid Course
 - 15.4.1 Principles of First Aid
 - 15.4.2 Breathing Emergencies
- 15.5 Hypothermia
 - 15.5.1 Anatomy and Physiology of Hypothermia
 - 15.5.2 Causes of Hypothermia
 - 15.5.3 First Aid for Hypothermia
 - 15.5.4 Signs and Symptoms of Hypothermia
- 15.6 Medical Advice over the Radio
 - 15.6.1 Introduction
 - 15.6.2 Preparing Information for Radioed Medical Advice
- 15.7 Medical Evacuation from a Vessel
 - 15.7.1 Evacuation by Helicopter
 - 15.7.2 Preparing a Victim for Transfer
 - 15.7.3 Ship-to-ship Transfer
- 15.8 Seasickness
 - 15.8.1 Causes
 - 15.8.2 Signs of Seasickness
 - 15.8.3 Treatment
- 15.9 Crew Fatigue
- 15.10 Carbon Monoxide Poisoning

Section 16.0 Emergencies at Sea

- 16.1 Learning Objectives
- 16.2 Crew Training for Emergencies
 - 16.2.1 Routines

- 16.2.2 Other Situations
- 16.3 Fire Precautions
 - 16.3.1 Fuel and Engines
 - 16.3.2 Electrical System
 - 16.3.3 Galley
- 16.4 Fire Prevention
- 16.5 Dealing with Fire on Board
 - 16.5.1 Using a Fire Extinguisher
 - 16.5.2 Assisting a Distressed Vessel on Fire
- 16.6 Man Overboard
 - 16.6.1 Rescue Drill: Quick Stop Method
 - 16.6.2 Rescue of Overboard Victim
 - 16.6.3 Making a Rescue Manoeuvre
 - 16.6.4 Recovery of Victim Back on Board
 - 16.6.5 Care of the Rescued Victim
- 16.7 Running Aground
 - 16.7.1 Immediate Action
 - 16.7.2 Refloating the Boat
 - 16.7.3 Leakage
 - 16.7.4 Taking on Water
- 16.8 Assisting a Vessel in Distress
 - 16.8.1 Responsibilities of a Rescuer
 - 16.8.2 Keeping a Log
 - 16.8.3 Waiver of Claims
- 16.9 Towing Techniques
 - 16.9.1 When to Tow
 - 16.9.2 When Not to Tow
 - 16.9.3 Towing Approaches
 - 16.9.4 The Long Tow
 - 16.9.5 Towing Alongside
 - 16.9.6 Safety While Towing
- 16.10 Rudder Emergencies
 - 16.10.1 Some Causes of Damage to the Steering System
 - 16.10.2 Emergency Repairs
 - 16.10.3 Emergency Steering Techniques
 - 16.10.4 Using a Drogue
 - 16.10.5 Emergency Tiller
- 16.11 Propeller Emergencies
 - 16.11.1 Propeller Damage
 - 16.11.2 Grounding
 - 16.11.3 Fouled Propeller

Section 17 Anchors and Anchoring

- 17.1 Learning Objectives
- 17.2 A Brief History
- 17.3 Holding Power
 - 17.3.1 Shape and Design of the Anchor
 - 17.3.2 The Nature and Slope of Bottom
 - 17.3.3 Scope
 - 17.3.4 Weight of the Anchor in Water
- 17.4 Loads
- 17.5 The Anchor Rode
- 17.6 Anchoring Techniques
 - 17.6.1 Standard Anchoring Technique
 - 17.6.2 Allow for Swing and Drift
 - 17.6.3 Anchor and Line Ashore
 - 17.6.4 To Reduce Yaw at Anchor
 - 17.6.5 Dragging Anchor
- 17.7 Using Two Anchors
 - 17.7.1 Situations where Two Anchors may be required
 - 17.7.2 Procedure
- 17.8 Weighing Anchor
 - 17.8.1 Un-hooking Techniques
 - 17.8.2 When All Else Fails

Appendix A Electronic Navigation**Appendix B First Aid Supplies and Equipment****Appendix C Waiver of Claims****Appendix D Search Patterns****Appendix E Deviation Table****Glossary****Bibliography**