

TABLE OF CONTENTS

<i>NATHANIEL BOWDITCH</i>	iii
<i>PREFACE</i>	vii

PART 1 — FUNDAMENTALS

CHAPTER 1. INTRODUCTION TO MARINE NAVIGATION	1
CHAPTER 2. GEODESY AND DATUMS IN NAVIGATION	15
CHAPTER 3. NAUTICAL CHARTS	23
CHAPTER 4. NAUTICAL PUBLICATIONS	51

PART 2 — PILOTING

CHAPTER 5. SHORT RANGE AIDS TO NAVIGATION	63
CHAPTER 6. COMPASSES	81
CHAPTER 7. DEAD RECKONING	99
CHAPTER 8. PILOTING	105
CHAPTER 9. TIDES AND TIDAL CURRENTS	129

PART 3 — ELECTRONIC NAVIGATION

CHAPTER 10. RADIO WAVES	151
CHAPTER 11. SATELLITE NAVIGATION	163
CHAPTER 12. LORAN NAVIGATION	173
CHAPTER 13. RADAR NAVIGATION	187
CHAPTER 14. ELECTRONIC CHARTS	199

PART 4 — CELESTIAL NAVIGATION

CHAPTER 15. NAVIGATIONAL ASTRONOMY	217
CHAPTER 16. INSTRUMENTS FOR CELESTIAL NAVIGATION	261
CHAPTER 17. AZIMUTHS AND AMPLITUDES	271
CHAPTER 18. TIME	275
CHAPTER 19. THE ALMANACS	287
CHAPTER 20. SIGHT REDUCTION	295

PART 5 — NAVIGATIONAL MATHEMATICS

CHAPTER 21. NAVIGATIONAL MATHEMATICS	317
CHAPTER 22. CALCULATIONS AND CONVERSIONS	329
CHAPTER 23. NAVIGATIONAL ERRORS	341
CHAPTER 24. THE SAILINGS	345

PART 6 — NAVIGATIONAL SAFETY

CHAPTER 25. NAVIGATION PROCESSES	363
CHAPTER 26. EMERGENCY NAVIGATION	373
CHAPTER 27. NAVIGATION REGULATIONS	383
CHAPTER 28. MARITIME SAFETY SYSTEMS	393
CHAPTER 29. HYDROGRAPHY	409

PART 7 — OCEANOGRAPHY

CHAPTER 30.	THE OCEANS	425
CHAPTER 31.	OCEAN CURRENTS	433
CHAPTER 32.	WAVES, BREAKERS AND SURF	441
CHAPTER 33.	ICE NAVIGATION	453

PART 8 — MARINE METEOROLOGY

CHAPTER 34.	WEATHER ELEMENTS	481
CHAPTER 35.	TROPICAL CYCLONES	503
CHAPTER 36.	WEATHER OBSERVATIONS	519
CHAPTER 37.	WEATHER ROUTING	545

NAVIGATION TABLES

EXPLANATION OF NAVIGATION TABLES	557
--	-----

MATHEMATICAL TABLES

TABLE 1.	LOGARITHMS OF NUMBERS	565
TABLE 2.	NATURAL TRIGONOMETRIC FUNCTIONS	575
TABLE 3.	COMMON LOGARITHMS OF TRIGONOMETRIC FUNCTIONS	598
TABLE 4.	TRAVERSE TABLES	621

CARTOGRAPHIC TABLES

TABLE 5.	NATURAL AND NUMERICAL CHART SCALES	666
TABLE 6.	MERIDIONAL PARTS	667
TABLE 7.	LENGTH OF A DEGREE OF LATITUDE AND LONGITUDE	672

PILOTING TABLES

TABLE 8.	CONVERSION TABLE FOR METERS, FEET, AND FATHOMS	673
TABLE 9.	CONVERSION TABLE FOR NAUTICAL AND STATUTE MILES	674
TABLE 10.	SPEED TABLE FOR MEASURED MILE	675
TABLE 11.	SPEED, TIME, AND DISTANCE	676
TABLE 12.	DISTANCE OF THE HORIZON	679
TABLE 13.	GEOGRAPHIC RANGE	680
TABLE 14.	DIP OF THE SEA SHORT OF THE HORIZON	682
TABLE 15.	DISTANCE BY VERTICAL ANGLE MEASURED BETWEEN SEA HORIZON AND TOP OF OBJECT BEYOND SEA HORIZON	683
TABLE 16.	DISTANCE BY VERTICAL ANGLE MEASURED BETWEEN WATERLINE AT OBJECT AND TOP OF OBJECT	685
TABLE 17.	DISTANCE BY VERTICAL ANGLE MEASURED BETWEEN WATERLINE AT OBJECT AND SEA HORIZON BEYOND OBJECT	687
TABLE 18.	DISTANCE OF AN OBJECT BY TWO BEARINGS	688

CELESTIAL NAVIGATION TABLES

TABLE 19.	TABLE OF OFFSETS	691
TABLE 20.	MERIDIAN ANGLE AND ALTITUDE OF A BODY ON THE PRIME VERTICAL CIRCLE	692
TABLE 21.	LATITUDE AND LONGITUDE FACTORS	694
TABLE 22.	AMPLITUDES	698
TABLE 23.	CORRECTION OF AMPLITUDE AS OBSERVED ON THE VISIBLE HORIZON	700
TABLE 24.	ALTITUDE FACTORS	701
TABLE 25.	CHANGE OF ALTITUDE IN GIVEN TIME FROM MERIDIAN TRANSIT	706
TABLE 26.	TIME ZONES, ZONE DESCRIPTIONS, AND SUFFIXES	708
TABLE 27.	ALTITUDE CORRECTION FOR AIR TEMPERATURE	709
TABLE 28.	ALTITUDE CORRECTION FOR ATMOSPHERIC PRESSURE	709

METEOROLOGICAL TABLES

TABLE 29.	CONVERSION TABLE FOR THERMOMETER SCALES	710
TABLE 30.	DIRECTION AND SPEED OF TRUE WIND IN UNITS OF SHIP'S SPEED	711
TABLE 31.	CORRECTION OF BAROMETER READING FOR HEIGHT ABOVE SEA LEVEL	712
TABLE 32.	CORRECTION OF BAROMETER READING FOR GRAVITY	712
TABLE 33.	CORRECTION OF BAROMETER READING FOR TEMPERATURE	712
TABLE 34.	CONVERSION TABLE FOR MILLIBARS, INCHES, AND MILLIMETERS OF MERCURY	713
TABLE 35.	RELATIVE HUMIDITY	714
TABLE 36.	DEW POINT	715

GLOSSARIES

GLOSSARY OF MARINE NAVIGATION	717
GLOSSARY OF ABBREVIATIONS AND ACRONYMS	855

INDEX

863-879