



# SEAMANSHIP TECHNIQUES

SHIPBOARD AND MARINE OPERATIONS

D. J. HOUSE  
FOURTH EDITION

# Seamanship Techniques

Shipboard and Marine Operations

*D.J. House*

1036

Fourth edition published 2014  
by Routledge  
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

and by Routledge  
711 Third Avenue, New York, NY 10017

*Routledge is an imprint of the Taylor & Francis Group, an informa business*

© 2014 David House

The right of David House to be identified as author of this work has been asserted by him in accordance with sections 77 and 78 of the Copyright, Designs and Patents Act 1988.

All rights reserved. No part of this book may be reprinted or reproduced or utilized in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publishers.

*Trademark notice:* Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

First edition published by Butterworth Heinemann 1987  
Second edition published by Butterworth Heinemann 2001  
Third edition published by Butterworth Heinemann 2004

British Library Cataloguing in Publication Data  
*A catalogue record for this book is available from the British Library*

Library of Congress Cataloging in Publication Data  
House, D. J.  
Seamanship techniques / D.J. House. — Fourth edition.  
pages cm.

Includes index.

1. Seamanship. I. Title.

VK541.H85 2013

623.88—dc23

2013005300

ISBN: 978-0-415-82952-6 (hbk)

ISBN: 978-0-415-81005-0 (pbk)

ISBN: 978-0-203-79670-2 (ebk)

Typeset in Sabon  
by Cenveo Publisher Services

Printed and bound in India by Replika Press Pvt. Ltd.

# Seamanship Techniques

## Shipboard and Marine Operations

## Other Works Published by D.J. House.

*Marine Survival* (3rd edition) 2011, Witherby

*Navigation for Masters* (4th edition) 2007, Witherby

*An Introduction to Helicopter Operations at Sea: A Guide for Industry* (2nd edition) 1998, Witherby

*Cargo Work* (7th edition, revised) 1998, Butterworth/Heinemann

*Anchor Practice: A Guide for Industry*, 2001, Witherby

*Marine Ferry Transports: An Operator's Guide*, 2002, Witherby

*Dry Docking and Shipboard Maintenance*, 2003, Witherby

*Heavy Lift and Rigging*, 2005, Brown Son & Ferguson

*The Seamanship Examiner*, 2005, Elsevier

*Ship Handling*, 2007, Elsevier

*The Ice Navigation Manual*, 2010, Witherby

*Elements of Modern Ship Construction*, 2010, Brown Son & Ferguson

Also:

*Marine Technology Reference Book* (Safety Chapter) edited by Nina Morgan, Butterworths

# Preface to the First Edition

This single-volume edition of general seamanship provides a comprehensive cover to the needs of marine students and serving seafarers. It is ideal for Merchant Navy Officers from Cadet rank to Master Mariner and incorporates all recent amendments to collision regulations.

In changing times the design and build of ships has altered and the needs of the professional mariner must be adapted to meet these modern times. However, old vessels do not disappear overnight and the old practices of basic seamanship are still required in all quarters of the globe. The practical seaman must adapt alongside a developing hi-tech industry and be able to improvise when the need arises.

This work takes account of many types of vessel engaged on many commercial trades and is expected to continue to be the accepted reference on general seamanship. It incorporates all the subjects required by the professional mariner, including: anchor work, rigging, cargo work, survival and boatwork, communications, search and rescue practice, watchkeeping, meteorology, marine instruments, tanker work and pollution, together with marine emergencies and ship-handling.

The marine industry is demanding in nature. It absorbs not only the ships which create its very existence, but also the personalities of the professional men and women cast within its perimeter. It has been my great fortune to have made the acquaintance of a number of these professionals, without whose teaching and understanding this work could never have evolved. My personal thanks are sincerely given, especially to the following:

J.W. Riley, Lt Cdr. (SCC, RNR Retd);

Mr A.R. Ollerton, Senior Lecturer, Nautical Studies, Master Mariner, DMS, AMBIM;

Mr J. Finch, Senior Lecturer, Nautical Studies, Master Mariner; and

my wife Lucia, just for being there.

# Preface to the Fourth Edition

The combined volume of *Seamanship Techniques* has evolved into this fourth edition alongside a rapidly changing maritime industry. Electronic navigation charts (ENCs) are now sitting comfortably alongside 'free-fall lifeboats', while automatic identification systems (AIS) technology has become a standard bridge interpretation. However, the role of the seaman, with all the modernization taking place, continues to be led by the first principle of seamanship – 'the safety of life at sea'.

Time has changed procedures, GPS has overpowered the use of the sextant, while 'fall-preventative devices' are now recommended when launching lifeboats. The many electronic systems of radar, ARPA, ECDIS and GMDSS alongside the romance of sail are actively sharing our seas. Such a diverse arena with the majesty of passenger vessels working with bunker barges and tugs is, therefore, bound to influence the young minds of maritime personnel.

With this in mind, this latest revision needs to incorporate the latest thoughts regarding the International Safety Management (ISM) culture and the essential elements of collision avoidance. Some recent incidents like the *Costa Concordia* and the loss of the *Riverdance* remind us that it is not a perfect world. The hazards of our industry are well known and will continue to test our seafarers with extreme weather conditions. We should not be looking to enhance nature's dangers by adding human error into our environment.

The text in this book does not have all the answers. It needs the support of practical experience when handling a ship in heavy weather. The knowledge of the meteorologists and Safety Officer need to be present on the navigation bridge. The execution of the Passage Plan must have the qualities of the Officer of the Watch and the lookout. Unexpected emergencies, like an on-board fire or a need to drydock, must be catered for with positive attitudes.

It takes time to train our people and the sea is unforgiving of those with an unprofessional attitude.

# Acknowledgements

I would like to express my appreciation and thanks to the following for their assistance in supplying diagrams, photographs and information relevant to this work:

Additional artwork by A. Benniston  
AFA – Minerva Ltd, Marine and Offshore Division  
AGA Spiro Ltd  
Anker Advies Bureau b.v.  
Anschutz & Co., GMBH  
Ateliers et Chantiers de Bretagne – ACB  
Beaufort Air-Sea Equipment Ltd  
British Ropes Ltd  
Bruce Anchor Ltd  
Bruntons (Musselburgh) Ltd  
Butterworth Systems (UK) Ltd  
C.M. Hammar Handels A.B.  
*Creative Ropework* (published by G. Bell & Sons Ltd) by Stuart E. Grainger  
Dubia Dry Docks  
Dunlop Beaufort Canada  
Dunlop Ltd  
E & FN Spon Ltd for references from *Cargo Access Equipment*  
E.H. Industries Ltd  
Elkem a/s Stalog Tau  
Elliott Turbomachinery Ltd/White Gill Bow Thrusters  
F.R. Fassmer & Co.  
F.R. Hughes & Co., Ltd  
General Council of British Shipping  
General Council of British Shipping/MNTB  
Heien – Larssen A/S  
Henry Brown & Son Ltd  
HM Coastguard – Maritime Rescue Sub Centre Formby, Liverpool  
HMSO – British Crown Copyright Reserved  
Holland Roer – Propeller, the Netherlands  
Hydrographic Department of the Navy  
I.C. Brindle & Co.  
Imtech Marine and Industry, the Netherlands  
J.M.Voith GmbH  
James Robertson & Sons, Fleetwood  
John Cairns Ltd (for extracts from the *International Manual of Maritime Safety* and *The S.O.S. Manual*)  
Kelvin Hughes Ltd, Naval & Marine Division of Smiths Industries Aerospace  
Lisnave Estaleiros Navais, S.A.  
Litton Marine Systems  
Lloyds Beal Ltd



Macgregor & Co. (Naval Architects) Ltd  
Maritime and Coastguard Agency  
Meteorological Office, U.K.  
Mitsubishi Heavy Industries Ltd, Shimonoseki Shipyard and Machinery Works  
MPJ Waterjets, Sweden  
Negretti & Zambra (Aviation) Ltd  
NEI Clarke Chapman Ltd, Clarke Chapman Marine  
P & O European (Irish Sea) Ferries  
Pains Wessex Schermuly Ltd  
RFD Inflatables Ltd  
Schilling Rudders  
Shutterstock Photograph Library  
Siebe Gorman & Company Ltd  
Sperry (Marine Systems) Ltd  
Stanford Maritime Ltd for references from *The Apprentice and His Ship* by Charles H. Cotter  
Stanford Maritime Ltd, for references from *Tugs* by Captain Armitage and from *Basic Shiphandling for Masters & Mates*, by P.F. Willerton  
The British Broadcasting Corporation  
*The Motor Ship* (published by IPC Industrial Press Ltd)  
The Nautical College, Fleetwood – Lancashire Education Committee  
The Solid Swivel Company Ltd  
The Welin Davit & Engineering Company Ltd  
Thomas Mercer Chronometers Ltd  
Thomas Walker & Son Ltd  
United States Coast Guard  
Wagner Engineering Associates Ltd  
Watercraft Ltd – Survival Craft Division  
Westland Helicopters Ltd  
Whessoe Systems and Controls Ltd  
Whittaker Corporation – Survival Systems Division  
Witherby Seamanship

*Additional Photography*

Capt. D.A. McNamee (AFNI)  
Capt. J.G. Swindlehurst, Master Mariner (MN)  
Capt. K. Millar, Master Mariner (MN)  
Mr. A.P.G. House (research assistant)  
Mr. G. Edwards, Ch/Eng. (retd)  
Mr. I. Baird, Ch/Off (MN)  
Mr. J. Legge, 2nd Officer (MN)  
Mr. J. Leyland, Lecturer Nautical Studies  
Mr. J. Roberts, 2nd Officer (MN)  
Mr. M. Croft, 1st Officer (MN)  
Mr. M. Gooderman, Master Mariner (MN), BSc  
Mr. P.P. Singh, Ch/Off (MN)  
Mr. Z. Anderson, Ch/Off (MN)

*Additional Assistance*

Mr. E. Hackett, Senior Lecturer, Nautical Studies  
Mr. C.D. House (IT Consultant)

# About the Author

David House has now written and published 17 marine titles, many of which are in multiple editions. After commencing his seagoing career in 1962, he was initially engaged on general cargo vessels. He later experienced worldwide trade with passenger, container, ro-ro, reefer ships and bulk cargoes. He left the sea in 1978 with a Master Mariner qualification and commenced teaching at the Fleetwood Nautical College, from where he retired in 2012, after 33 years of teaching in nautical education.

The experience he gained in both a seagoing capacity and as a lecturer of marine studies led to maritime titles, for all ranks from Cadet to Master Mariner. His books are well read and respected around the world, covering such topics as ice navigation, cargo operations, communications and all areas of general seamanship.

He continues to work in the maritime field with the International Institute of Nautical Surveyors, and in a private marine consultancy role. His works are regularly updated and his books on marine survival, drydocking, ship construction, helicopter operations and anchor practice are appreciated on many bookshelves in virtually all the maritime nations.



# Abbreviations

Search-and-rescue specific abbreviations can be found on p. 583 at the end of Chapter 16.

ABS	American Bureau of Shipping
AC (i)	Admiralty Class (Cast)
AC (ii)	alternating current
ACV	air cushion vessel
AHV	anchor handling vessel
AIS	automatic identification systems
ALBA	compressed air deck line
ALRS	Admiralty list of radio signals
AMD	advanced multi-hull design
AMIRIS	advanced maritime infrared imaging system
AMVER	automated mutual vessel reporting system
AP	aft perpendicular
ARCS	Admiralty raster chart service
ARPA	automatic radar plotting aid
ATT	Admiralty tide tables
AUSREP	Australian ship reporting system
aux	auxiliary
B	position of the centre of buoyancy
B/A	breathing apparatus
B/L	bill of lading
BP (i)	between perpendiculars
BP (ii)	British Petroleum
BS	breaking strain
BST	British summer time
BT	ballast tank
BV	Bureau Veritas
CABA	compressed air breathing apparatus
cc	corrosion control (LR – notation)
CCTV	closed circuit television
CD (i)	chart datum
CD (ii)	compact disc
CDP	controlled depletion polymers
CES	Coast Earth Station
CG	Coast Guard
CIE	International Commission on Illumination
CL	centre line
cm	centimetres
CMG	course made good
CML	Centre of Maritime Leadership (USA)
CMS	constantly manned station

CNIS	Channel Navigation Information Service
CO	Chief Officer
CO <sub>2</sub>	carbon dioxide
COG	course over ground
C of B	centre of buoyancy
C of G	centre of gravity
COI	Certificate of Inspection (as issued by USCG)
ColRegs	The Regulations for the Prevention of Collisions at Sea
COW	crude oil washing
C/P	charter party
CPA	closest point of approach
CPP	controllable pitch propeller
CPR	cardiac pulmonary resuscitation
CQR	Chatham quick release
CRS	Coast Radio Station
CSH	continuous survey hull
CSM	continuous survey machinery
CSP	commencement search pattern
CSS (code)	IMO Code of Safe Practice for Cargo Stowage and Securing
CSWP	Code of Safe Working Practice
CW	continuous wave
Cwt	hundredweight
Da	draught aft
DAT	double acting tanker
dB	decibels
DB	double bottom
DBC	Dunlop Beaufort Canada
DC	direct current
DD	drydock
Df	draught forward
DGN	dangerous goods note
DGPS	differential global positioning system
Disp	displacement
Dm	midships draught
DNV	Det Norske Veritas
DNV-W1	one-man operation (DNV notation)
DOC (Alt. DoC)	document of compliance
DP	dynamic position
DPA	designated person ashore
DR	dead reckoning
DSC (i)	digital selective calling
DSC (ii)	dynamically supported craft
DSV	diving support vessel
DW (i)	dock water
DW (ii)	deadweight
DWA	dock water allowance
dwt	deadweight tonnage
E	east

EBM (EBI)	electronic bearing marker
EC	European Community
ECDIS	electronic chart display and information system
ECR	engine control room
EEBDs	emergency escape breathing device
EFSWR	extra flexible steel wire rope
ENC	electronic navigation chart
EPIRB	emergency position indicating radio beacon
ETA	estimated time of arrival
ETD	estimated time of departure
ETV	emergency towing vessel
EU	European Union
FFA	fire-fighting appliances
FLIR	forward looking infra red
FMECA	failure mode effective critical analysis
FO	fuel oil
foap	forward of aft perpendicular
FPD	fall prevention device
FPk	fore peak tank
FPSOs	floating production storage offloading system
FPV	fisheries protection vessel
FRC	fast rescue craft
FRD (Fwd)	forward
FSE	free surface effect
FSMs	free surface moments
FSU	floating storage unit
FSW	friction stir welding
FSWR	flexible steel wire rope
FU	follow-up
FW	fresh water
FWA	fresh water allowance
FWE	finished with engines
G	ship's centre of gravity
gals	gallons
GG 1	distance measured from the ship's original C of G, to a new position of the ship's C of G
GHz	gigahertz
GL	Germanischer Lloyd
GM	metacentric height
GMDSS	global maritime distress and safety system
GMT (z)	Greenwich Mean Time
GPS	global positioning system
GRB	garbage record book
GRP	glass reinforced plastic
grt (GT)	gross registered tonnage
GZ	ship's righting lever
HDOP	horizontal dilution of precision
HEX	hexagonal

HF	high frequency
HFO	heavy fuel oil
H/L	heavy lift
HLO	helicopter landing officer
HMAS	Her Majesty's Australian Ship
HMS	Her Majesty's Ship
HMSO	Her Majesty's Stationery Office
HP (i)	horse power
HP (ii)	high pressure
HPFWW	high pressure fresh water wash
HRN	house recovery net
HRU	hydrostatic release unit
HSC	high-speed craft
HSE	health and safety executive
HSSC	Harmonised System of Survey and Certification
I	intensity
IACS	International Association of Classification Societies
IALA	International Association of Lighthouse Authorities
IAMSAR	International Aeronautical and Marine Search & Rescue manual
IBC	International Bulk Chemical Code
ICAA	International Civil Aviation Authority
ICS	International Chamber of Shipping
IE	index error
IFR	instrument flying rating
IGS	inert gas system
IHO	International Hydrographic Office
IIP	International Ice Patrol
ILO	International Labour Organization
IMDG	International Maritime Dangerous Goods (code)
IMO	International Maritime Organization
INF	irradiated nuclear fuel
INS	integrated navigation system
IOPPC	international oil pollution prevention certificate
IPMS	integrated platform management system
IPS	integrated power system (controllable 'podded' propulsion)
IRF	incident report form
ISM	International Safety Management (code)
ISO	International Organization of Standardization
ISPS	International Ship and Port Security (code)
ITP	intercept terminal point
ITU (i)	International Transport Union
ITU (ii)	International Telecommunications Union
IWS	in water survey
K	representative of the position of the ship's keel
KG	distance measured from the keel to the ship's C of G
Kg	kilogram
kHz	kilohertz
kJ	kilojoule

KM	distance measured from the keel to the metacentre 'M'
kN	kilo newtons
kts	knots
kW	kilowatt
Lat	latitude
LBP	length between perpendiculars
lbs	pounds
LCB	longitudinal centre of buoyancy
LCD	liquid crystal display
LCG	longitudinal centre of gravity
LCV	landing craft vessel
LFL	lower flammable limit
LMC	Lloyd's Machinery Certificate
LNG	liquid natural gas
LOA	length overall
LOF	Lloyd's Open Form (salvage)
Lo-Lo	load on, load off
Long	longitude
LP	low pressure
LPG	liquid petroleum gas
LR	Lloyd's Register
LSA	life-saving appliances
LUT	land user terminal
M	metacentre
m	metres
MA	mechanical advantage
MAIB	Marine Accident Investigation Branch
MARPOL	Marine Pollution (convention)
mbs	millibars
MCA	Maritime and Coastguard Agency
MCTC	moment to change trim 1 centimetre
MEC	marine evacuation chute
Medivac	medical evacuation
MEPC	Marine Environment Protection Committee
MES	marine evacuation system
MEWP	mobile elevator work platform (cherry picker)
MF	medium frequency (300 kHz to 3 MHz)
MFAG	Medical First Aid Guide (for use with accidents involving dangerous goods)
MGN	marine guidance notice
MHR	mean hull roughness
MHz	megahertz
MIN	marine information notice
MMSI	maritime mobile service identity number
MN	Mercantile Marine (Merchant Navy)
MNTB	Merchant Navy Training Board
MoB	man over board
MODU	mobile offshore drilling unit
MPCU	marine pollution control unit

m rads	metre radians
MRCC	marine rescue coordination centre
m/s	metres per second
MSC	Maritime Safety Committee (of IMO)
MSI	marine safety information
MSL	mean sea level
MSN	merchant shipping notice
MV	motor vessel
MW	megawatt
N	north
NE	northeast
NFU	non-follow-up
nm	nautical miles
NOE	notice of eligibility
NP	national publication
NUC	not under command
NVE	night vision equipment
NVQ	national vocational qualification
NW	northwest
O/A	overall
OBO	oil, bulk, ore (carrier)
OiC	officer in charge
OIM	offshore installation manager
OLB	official log book
OMB	one-man bridge
OMBO	one-man bridge operation
OOW	Officer of the Watch
OPIC	oil pollution insurance certificate
ORB	oil record book
O/S	offshore
OSC (i)	on scene commander
OSC (ii)	on scene coordinator
OSV	offshore standby vessel
P	port
P/A	public address system
P & I (club)	Protection & Indemnity
PEC	pilot exemption certificate
PHA	preliminary hazard analysis
P/L	position line
ppm	parts per million
PRS	Polish Register of Shipping
PSC	port state control
PSC & RB	personal survival craft & rescue boat
psi	pounds per square inch
pts	pints
RAF	Royal Air Force
RBD	return of births and deaths
RCC	rescue coordination centre



RCDS	raster chart display system
RD	relative density
RINA	Registro Italiano Navale (Classification Society – Italy)
RMC	refrigerated machinery certificate
RMS	Royal Mail ship
RN	Royal Navy
RNR	Royal Naval Reserve
ro-pax	roll on–roll off passenger vessel
ro-ro	roll on–roll off
RoT	rate of turn
ROV	remotely operated vehicle
rpm	revolutions per minute
RS	reflected sun
RT	radiotelephone
Rx	receiver
S	south
S (Stbd)	starboard
SAR	search and rescue
SARSAT	search and rescue satellite
SART	search and rescue transponder
SATCOM	satellite communications
SBE	stand by engines
SBM	single buoy mooring
SCBA	self-contained breathing apparatus
SE	southeast
SES (i)	ship earth station
SES (ii)	surface effect ship
SF	stowage factor
SFP	structural fire protection
sg	specific gravity
shp	shaft horse power
SI	statutory instrument
SMC (i)	safety management certificate
SMC (ii)	SAR mission coordinator
SMG	speed made good
SMS	safety management system
SOG	speed over ground
SOLAS	Safety of Life at Sea (convention)
SOPEP	ship's oil pollution emergency plan
SPC	self polishing copolymer (anti-fouling paint)
SPM	single point mooring
SQU (sq)	square
SS	steam ship
SSA	Ship Building and Ship Repair Association
SSP	Siemens–Schottel Propulsion
stbd	starboard
STCW	standards of training, certification and watchkeeping
SW	salt water