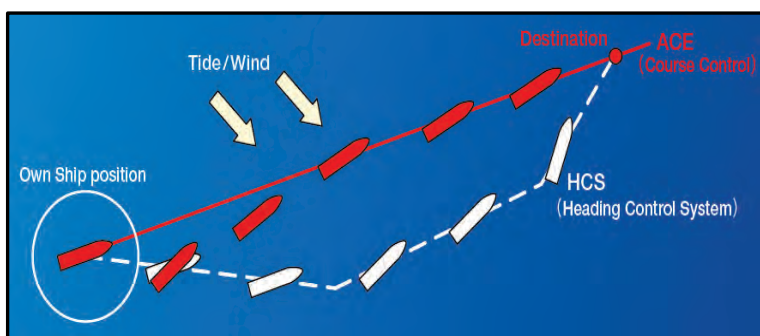


A.C.E. - Advanced Control for Economy Route Track-Control for PR-9000 Autopilots

Tokyo Keiki's new ACE Course Control function automatically implements the best rudder commands to provide fuel cost savings.

Estimated Annual Fuel Savings USD\$20,000 - \$100,000+

- ACE saves fuel by optimizing steering to maintain the straightest course possible. Savings* depends on the ship's size, shape, sea conditions, etc. Typical savings range between 1-1.5% of fuel costs.
- ACE works by mitigating drift caused by wind and currents.
- ACE brings modern Autopilot technology to legacy PR-9000 Autopilots at an affordable price.
- Owners often recoup the initial ACE expense within months.
- ACE is ideal for larger vessels that are more prone to the influence of wind and current.
- High quality product from Tokyo Keiki; installed by Mackay Marine.



ACE Course Control function creates the shortest path along the course steered; this promotes fuel savings while mitigating cross track error (XTD).

ACE Characteristics

- Operates the same as normal Heading Control. Changeover between ACE function and Heading Control is done by a single push of a button.
- Route deviation is reduced, allowing the vessel to sail the shortest distance to the destination without influence from tides and wind.
- Reduction in course changes decrease the amount of Rudder used, thus lessens the burden on the Helmsman.
- Installation is simple, typically performed in a single day

ACE Est. Savings Analysis with Current Fuel Market

VLCC Tanker: Fuel Oil Consumption = 104 MT/DAY

- o $104 \text{ MT/DAY} \times 0.01 (1.0\%) = 1.04 \text{ MT/DAY}$
- o $1.04 \text{ MT/DAY} \times \text{USD } \$400/\text{MT} = \text{USD } \$416/\text{Day} \times 200 \text{ OP days}$

Potential ANNUAL SAVINGS*

\$83,000 / Year USD

Container: Fuel Oil Consumption = 150 MT/DAY

- o $150 \text{ MT/DAY} \times 0.015 (1.5\%) = 2.25 \text{ MT / DAY}$
- o $2.25 \text{ MT/DAY} \times \text{USD } \$400/\text{MT} = \text{USD } \$900/\text{DAY} \times 200 \text{ OP days}$

\$180,000 / Year USD

Handysize Bulker: Fuel Oil Consumption = 20 MT/DAY

- o $20 \text{ MT/DAY} \times 0.0147 (1.47\%) = 0.294 \text{ MT / DAY}$
- o $0.294 \text{ MT/DAY} \times \text{USD } \$400/\text{MT} = \text{USD } \$118/\text{DAY} \times 200 \text{ OP days}$

\$23,000 / Year USD

2016 Press Release – TOKYO-Mitsui O.S.K. Lines, Ltd. (MOL) Announced that the company, along with Tokyo Keiki Inc., conducted a performance demonstration test of its autopilot route control function A.C.E., onboard a vessel in service. The results show an energy savings of about 1.5%.

Full Press Release: <https://www.mol.co.jp/en/pr/2016/16017.html>



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Mackay Communications, Inc. ®
dba Mackay Marine
3691 Trust Drive, Raleigh, NC 27616, USA
+1 919 850 3000 info@mackaycomm.com

Mackay World Service – 24/7
Phone: U.S. +1 888 361 8532
Intl. +1 281 478 6245
e-Fax: +1 212 500 0013
service@mackaymarine.com

* Represents a Regional Service Depot
& World Service Coordination Center

Commercial Marine Sales
Phone: +1 281 479 1515
e-Fax: +1 212 901 0909
marinesales@mackaymarine.com

Satellite Services (Equip. & Airtime)
+1 919 850 3100
satserv@mackaycomm.com

Europe, Middle East, Asian Depots 04/25

* **Rotterdam, Netherlands – Debbie Fraser**
Plaza 24F, 4782SK Moerdijk NL
+31 168 744021
rotterdam@mackaymarine.com

Antwerp, Belgium – Karen Lenjou
Noorderlaan 109, 2030 Antwerp BE
+32 3 808 3963 antwerp@mackaymarine.com

Hamburg & Leer, Germany – James Pritchett
Gutenbergring 67B, 22848 Norderstedt DE
+49 40 66 892 140 hamburg@mackaymarine.com
Hafenstraße 6, 26789 Leer
+49 491 9989 9904 leer@mackaymarine.com

Algeciras, Santander & Valencia, SPAIN;
Las Palmas, Canary Islands – Laura Housley
Avda Océano Atlántico, 9 (02/25 - Address)
11379, Palmones, Cádiz ES
+34 856 143 006 spain@mackaymarine.com

London, Southampton, Liverpool, Teesport,
Edinburgh, Aberdeen, U.K. – Warren Halls
Unit B3 Mill Ct., Spindle Way, Crawley RH10 1TT
+44 1737 372679 uk@mackaymarine.com

Istanbul, TURKEY – Metehan Arslanoglu
Güzelyah Mah, Safran Sok. No:3 34903 Pendik
+90 216 206 01 66, turkey@mackaymarine.com

Fujairah & Dubai, U.A.E. – Damiao Furtado
#1403, Al Hilal Business Tower
Al Hilal City, Sakamkam, Fujairah UAE
+971 9236 4433 middleeast@mackaymarine.com

* **Mumbai, Kandla/Mundra, Chennai, Vizag,**
Kolkata, INDIA – Rohan Chitre (4/25 Addr. /PH)
Unit No.1205/06/07, 12th Floor, E-Wing, Lodha
Supremus, Kanjurmarg (East), Mumbai-400042 IN
+91 22 6529 9600 india@mackaymarine.com

Singapore & Malaysia – Mohamed Nabil
2 Corporation Rd, #05-12, Corporation Place
Singapore 618494 SG +65 6686 2806
singapore@mackaymarine.com
malaysia@mackaymarine.com

* **Hong Kong – Austin Wang**
Unit 08, 6/F, Tower 1, Magnet Place
77-81 Container Port Road, Kwai Chung HK
+852 3956 4788 hongkong@mackaymarine.com

Guangzhou, Ningbo, Qingdao, Shanghai,
Shenzhen & Tianjin CHINA – Austin Wang
Room 127, Building 6, 787 Kangqiao Rd. Pudong
New Area, Shanghai PRC
+86 21 6190 0683 china@mackaymarine.com

North American - Atlantic Coast

New York / N.J. – Andy Blank
165 Fieldcrest Ave., Edison, NJ 08837
+1 732 225 0909
newyork@mackaymarine.com

Norfolk, VA – Rebecca Dunham
1720 Lambert Ct., Suite H
Chesapeake, VA 23320
+1 757 548 8900
norfolk@mackaymarine.com

N. Charleston, SC – Gary Polmanteer
4208-A Pace Street, SC 29405
+1 843 747 6250
charleston@mackaymarine.com

Savannah, GA +1 843 747 6250
savannah@mackaymarine.com

Govt. Division – Venice Anderson
Jacksonville, FL +1 904 880 4633
govt@mackaycomm.com

Eastern CANADA

St. John's, NL – Glenn Butt
+1 709 726 2422
stjohns@mackaymarine.com

Halifax, NS /Maritimes– Brian Sibley
+1 902 468 8480
halifax@mackaymarine.com

So. Nova Scotia- Lauren D'Entremont
+1 902 742 3423 (Yarmouth)
+1 902 378 2062 (Digby) (2/24)
+1 902 575 2025 (Barrington)
yarmouth@mackaymarine.com
digby@mackaymarine.com
barrington@mackaymarine.com

Quebec City, QC - Carole Fortin
+1 418 614 0782
quebec@mackaymarine.com

Projects & Ontario +1 613 498 5073
steven.robichaud@mackaymarine.com

North American - Gulf & FL Coast

* **Houston, TX – Stuart Marlar**
921 Seaco Ave., Deer Park, TX 77536
Phone: +1 281 479 1515
e-Fax: +1 212 901 0909
houston@mackaymarine.com

Corpus Christi, TX: +1 281 479 1515
corpus@mackaymarine.com

New Orleans LA & Mobile AL–Fred Heinzl
1305D Distributors Row, Harahan, LA 70123
+1 504 733 5824
nola@mackaymarine.com

Mobile, AL: +1 504 733 5824
mobile@mackaymarine.com

Miami /Jacksonville, FL – Mike Moretti
11360 Interchange Circle North
Miramar, FL 33025 +1 954 431 7223
miami@mackaymarine.com

Tampa, FL +1 954 431 7223
tampa@mackaymarine.com

Central & South America

Panama City, PANAMA – Juan Castillo
Pan Canal Plaza-Room 208, Albrook
+507 315 0697
panama@mackaymarine.com

Lima, PERU – Jorge Velez (6/24)
+1 281 478 6245 peru@mackaymarine.com

Valparaiso, CHILE - Miguel Tavella
+56 9 2885 6520 chile@mackaymarine.com

Rio de Janeiro, Macae, Santos,
& São Luis, BRAZIL - Andre Britto
Av. Emb. Abelardo Bueno 3500
Suites 713-724, Rio de Janeiro 22775-040
+55 21 3410 8803
brazil@mackaymarine.com

North American - Pacific Coast

Dutch Harbor, AK – Brynn Decker
2315 Airport Beach Rd
Dutch Harbor, AK 99692
+1 907 581 1679 (Naknek Seasonal)
dutchharbor@mackaymarine.com

Vancouver, BC CANADA – Ben Staggs
2999 Underhill Avenue, Unit 210
Burnaby, BC V5A3C2 +1 604 435 1455
vancouver@mackaymarine.com

Seattle / Ballard, WA – Brynn Decker
(Comm'l Fishing, Ferries, Yachts)
4030 23rd Ave. West, Seattle, WA 98199
+1 206 282 8080 ballard@mackaymarine.com

Newport, OR +1 541 221 5538
newport@mackaymarine.com

Seattle / Tacoma, WA – Jeremy Dirks
(Deep Seas, also covers Portland OR)
5007 Pacific Highway East, Suite 23
Tacoma, WA 98424 +1 253 922 6260
seattle@mackaymarine.com

San Francisco, CA – Tony Boyd
3065 Richmond Parkway, Suite 104
Richmond, CA 94806 +1 510 669 9560
sf@mackaymarine.com

Los Angeles, CA – Sam Boyd
1891 N. Gaffey Street, Suite D
San Pedro, CA 90731 +1 310 519 7539
la@mackaymarine.com

Africa

Cape Town, Durban, Port Elizabeth &
Richard's Bay, So. AFRICA – Waldo Fourie
2 Milner St., 1st Floor, Metro Industrial
Cape Town, 7405 SA +27 21 276 1240
southafrica@mackaymarine.com

Walvis Bay, NAMIBIA +27 21 276 1240
namibia@mackaymarine.com (6/24)