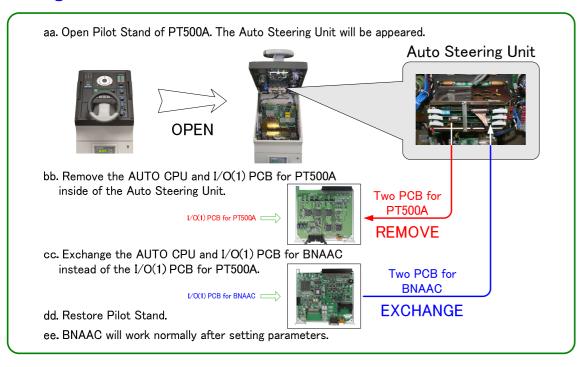
TEST RESULT OF FUEL CONSUMPTION

◆ Container Vessel (6,200TEU) and Cape Size Bulk Carrier (Example)

Soo State	Average	Average	
Sea State	Container [%]	180 BC [%]	
2	0.85	0.71	
3	1.11	0.93	
4	1.76	1.31	
5	_	0.52	
TOTAL	1.12	0.93	

UPDATE PROCEDURE FROM PT500A

- ◆ Upgrading time will be only about 2hours, and can be upgraded on berthing under cargo handling, without sea trial.
- ◆ PT500D AutoPilot also can be upgrade to BNAAC by exchanging Auto Steering Unit.





Caution:

Represented by:

Please read the manual before using this product

Marine Equipment Business Division
Address: Minami Shinjuku Hoshino Bldg.

5-23-13 Sendagaya, Shibuya-ku, Tokyo, 151-0051 JAPAN

International Sales Dept. Phone: (81) 3-3225-5383 FAX: (81) 3-3225-5316 Service Dept. Phone: (81) 3-3225-5392 FAX: (81) 3-3225-5316 Domestic Sales Dept. Phone: (81) 3-3225-5382 FAX: (81) 3-3225-5316

 Osaka Branch
 Phone: (81) 6-4706-8027
 FAX: (81) 6-4706-8028

 Imabari Branch
 Phone: (81) 898-22-4559
 FAX: (81) 898-33-2005

 Fukuoka Branch
 Phone: (81) 95-826-5552
 FAX: (81) 95-826-5553



AUTOPILOT BNAAC

Batch Noise Adaptive Autopilot Controller

PT500 Series UPGRADE



YDK Technologies Co., Ltd.

Bulletin 80B22M01E 2nd Edition

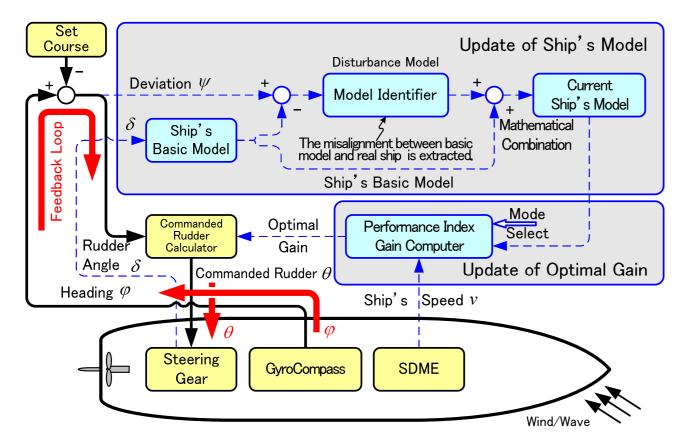
AUTOPILOT "BNAAC"

BNAAC IS THE NEW FUEL SAVE TYPE AUTOPILOT INTRODUCED THE LATEST MODERN CONTROL THEORY.

FEATURES

- ◆ Easy Settlement of the Ship's Basic Model
- ◆ Automatic Update of the Ship's Disturbance Model
- ◆ Improvement of Rudder Controllability by Detection of Disturbance
- ◆ Automatic Setting of Rudder Control Gain Optimally
- ◆ "Improvement of Fuel Cost" as Result of the Above-Mentioned Features

BNAAC BLOCK DIAGRAM



- ◆ Red arrow shows normal autopilot control loop. (Feedback Loop)
- ♦ Ship's Basic Model

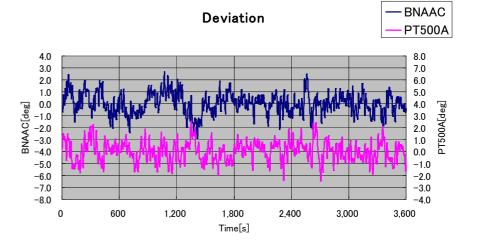
This model estimates ship's deviation based on the rudder input.

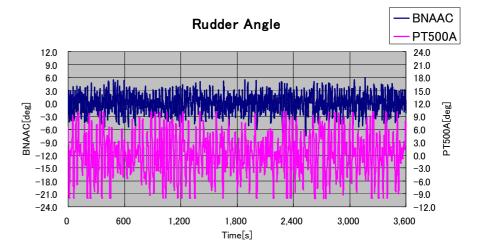
- ◆ Model Identifier (Disturbance Model)
 - This model estimates disturbance around the ship.
- ◆ Current Ship's Model

This model is update Ship's character and disturbance.

◆ Performance Index and Gain Computer This function calculates optimal rudder gain by current ship's model.

TEST RESULT OF CONTROLLABILITY







Ship's Type	Draught	Improvement Rate[%]			
		Rudder Angle	Deviation	Ship's Speed	Fuel Conpumption
VLCC	Full	60.89	-1.08	0.203	0.61

- ◆ BNAAC has achieved course keeping equal with PT500A by an amount of the steer which is 60% less.
- ◆ ship's speed was improved by BNAAC. As a result, fuel consumption was reduced compared with PT500A.