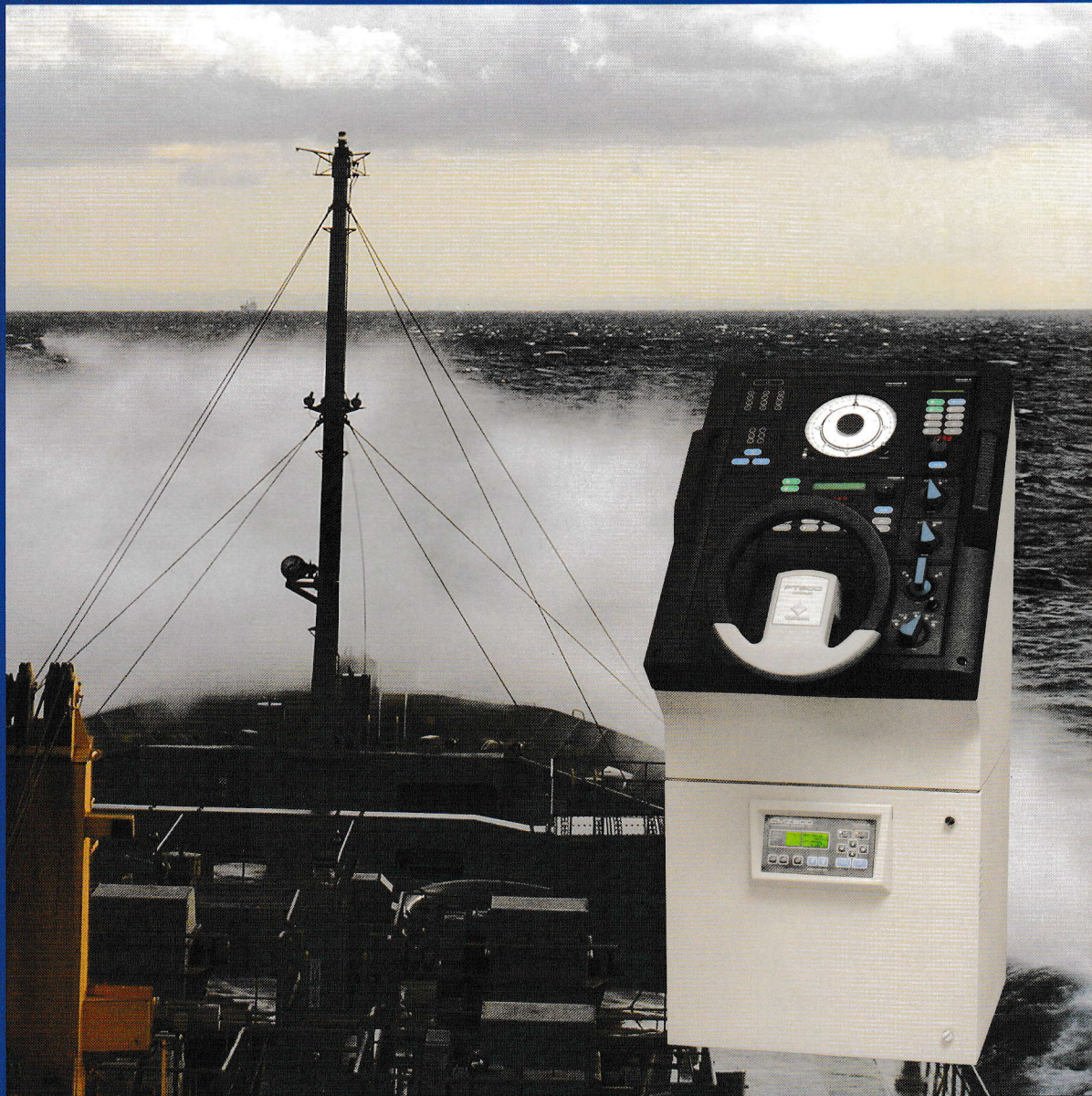


AUTOPILOT ***BNAAC***

Batch Noise Adaptive Autopilot Controller

PT500 Series UPGRADE



Yokogawa Denshikiki Co., Ltd.

Bulletin 80B22M01E
1st Edition

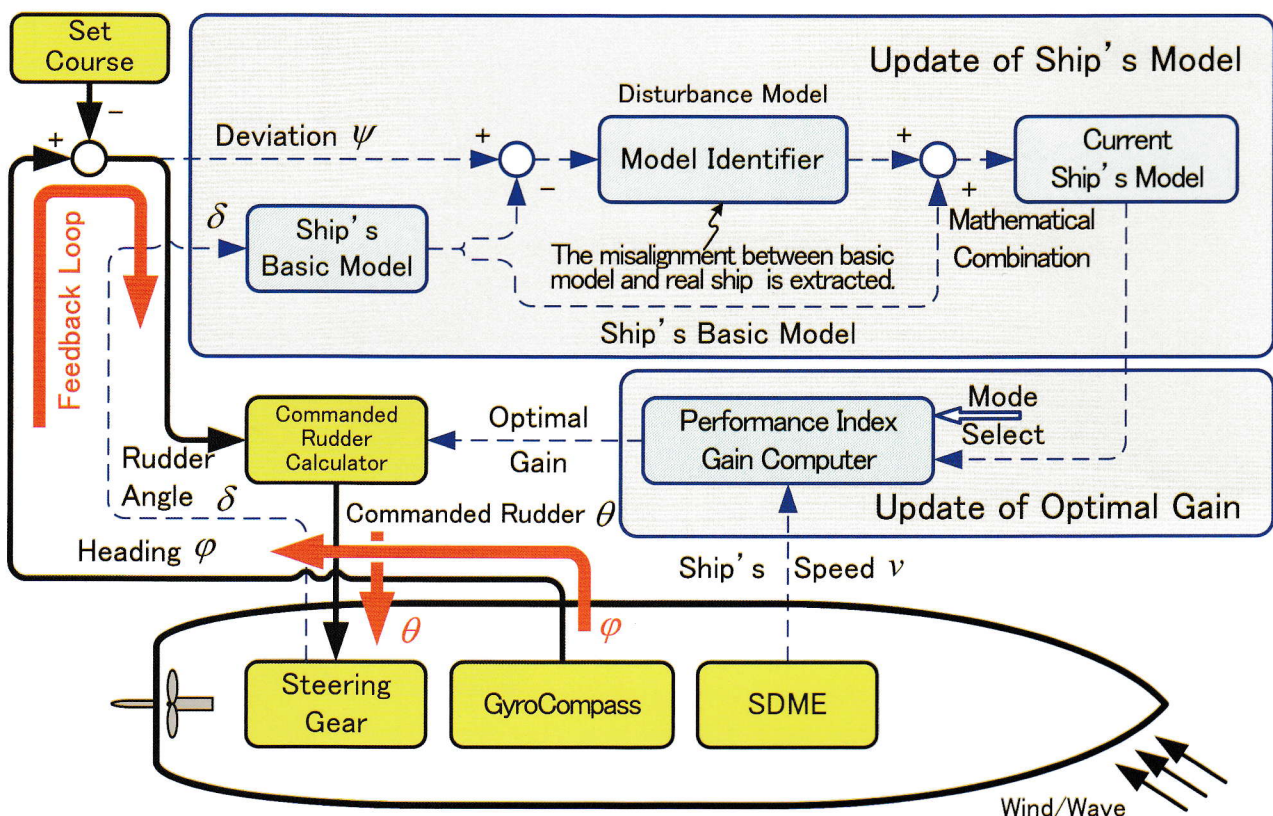
AUTOPILOT "BNAAC"

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

FEATURES

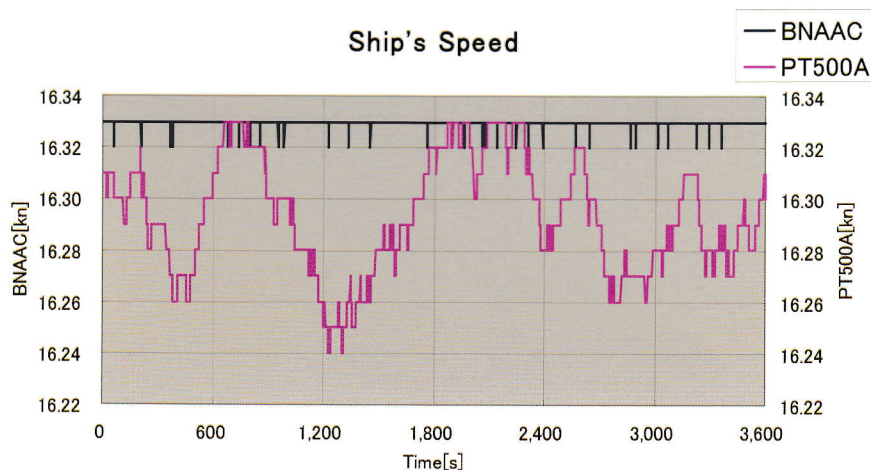
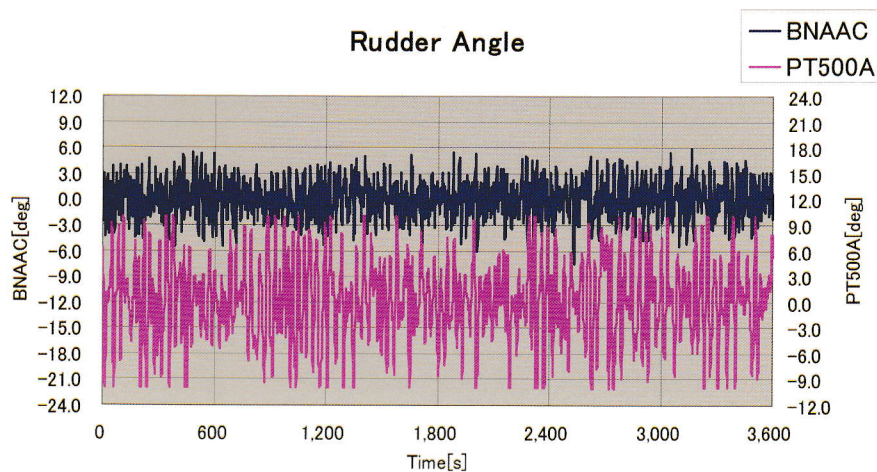
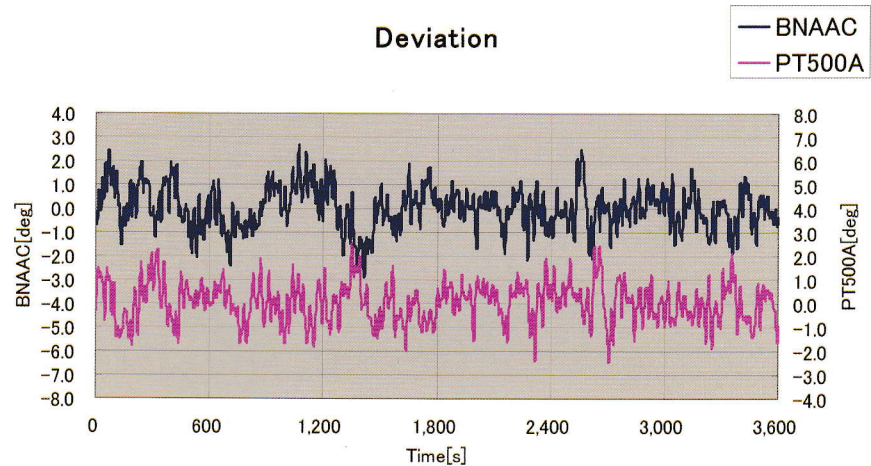
- ◆ Easy Settlement of the Ship's Basic Model
- ◆ Automatic Update of the Ship's Disturbance Model
- ◆ Improvement of Rudder Controllability by Detection of Disturbance
- ◆ Automatic Setting of Rudder Control Gain Optimally
- ◆ "Improvement of Fuel Cost" as Result of the Above-Mentioned Features

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 Consumption
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.

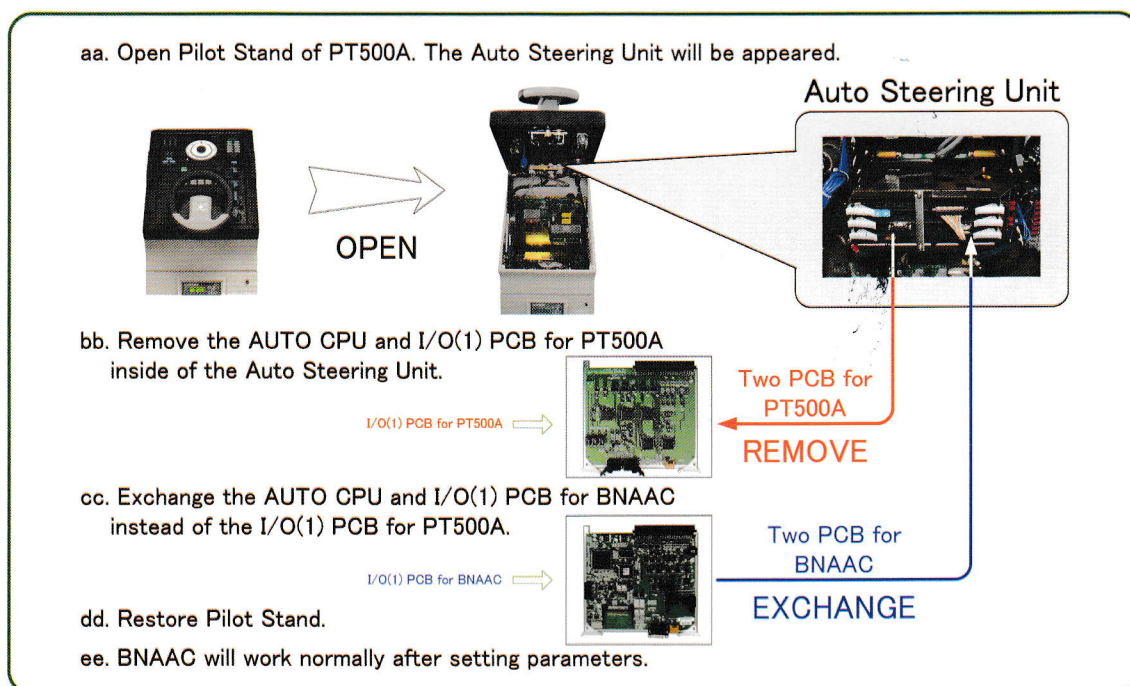
TEST RESULT OF FUEL CONSUMPTION

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

Sea State	Average Container [%]	Average 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.



YOKOGAWA



Yokogawa Denshikiki Co., Ltd.

URL : <http://www.yokogawa.com/ydk/>



Caution: Please read the manual before using this product

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