

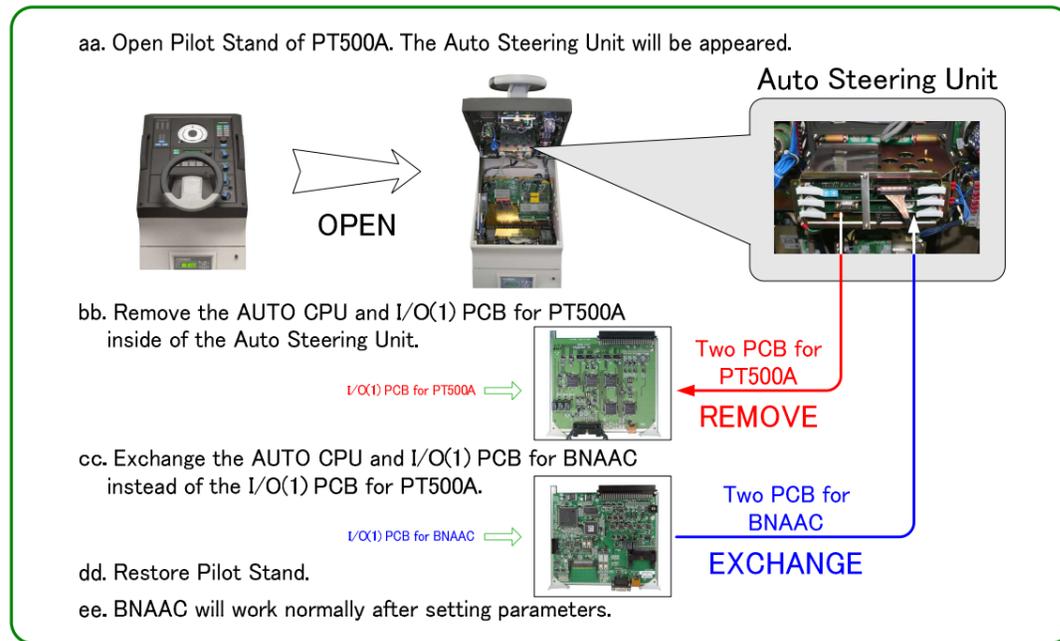
TEST RESULT OF FUEL CONSUMPTION

◆ 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.



AUTOPILOT BNAAC

Batch Noise Adaptive Autopilot Controller

PT500 Series UPGRADE



Represented by:

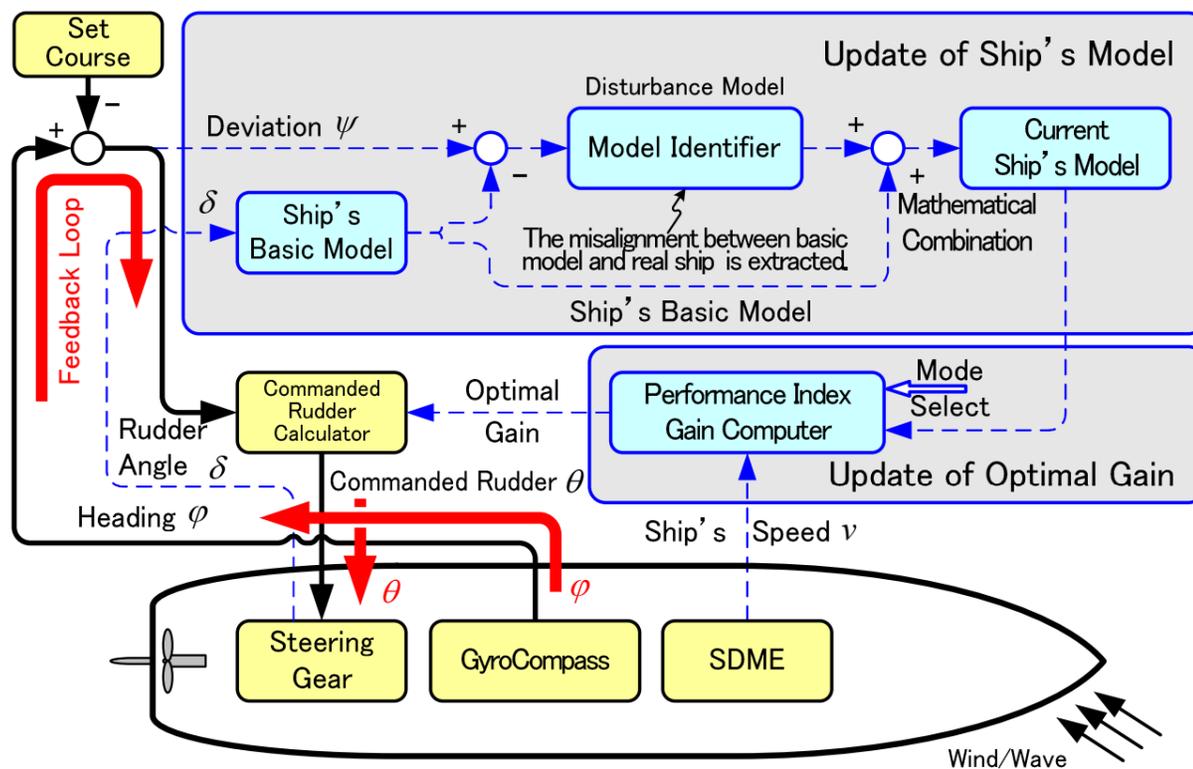
AUTOPILOT "BNAAC"

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

FEATURES

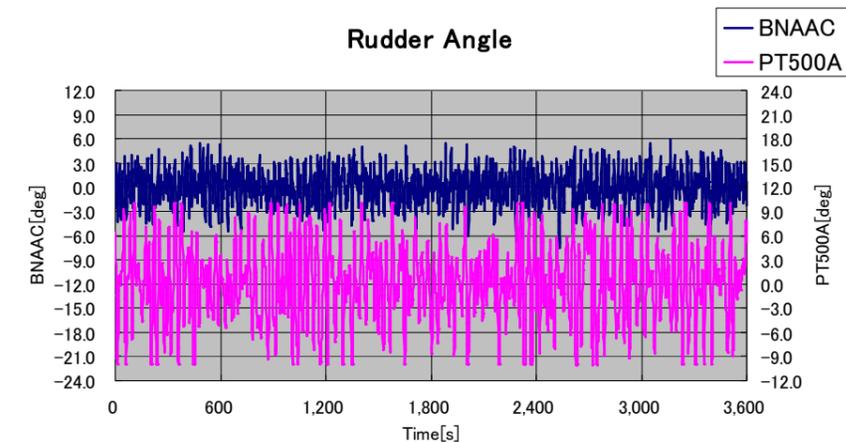
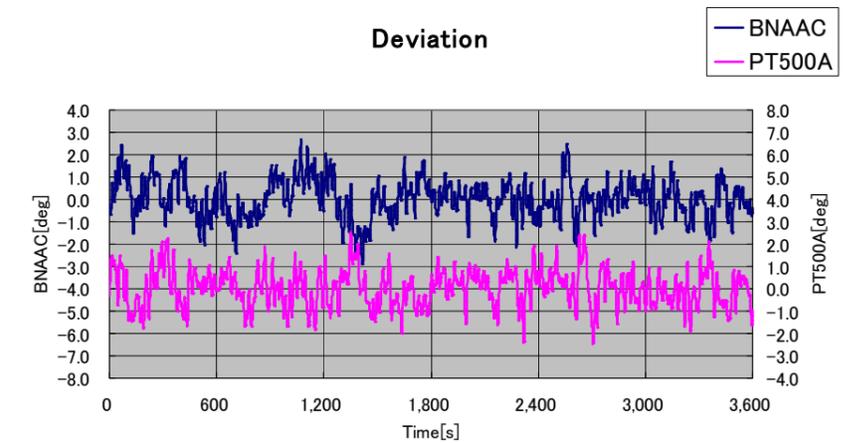
- ◆ Easy Settlement of the Ship's Basic Model
- ◆ Automatic Update of the Ship's Disturbance Model
- ◆ Improvement of Rudder Controllability by Detection of Disturbance
- ◆ Automatic Setting of Rudder Control Gain Optimally
- ◆ "Improvement of Fuel Cost" as Result of the Above-Mentioned Features

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.