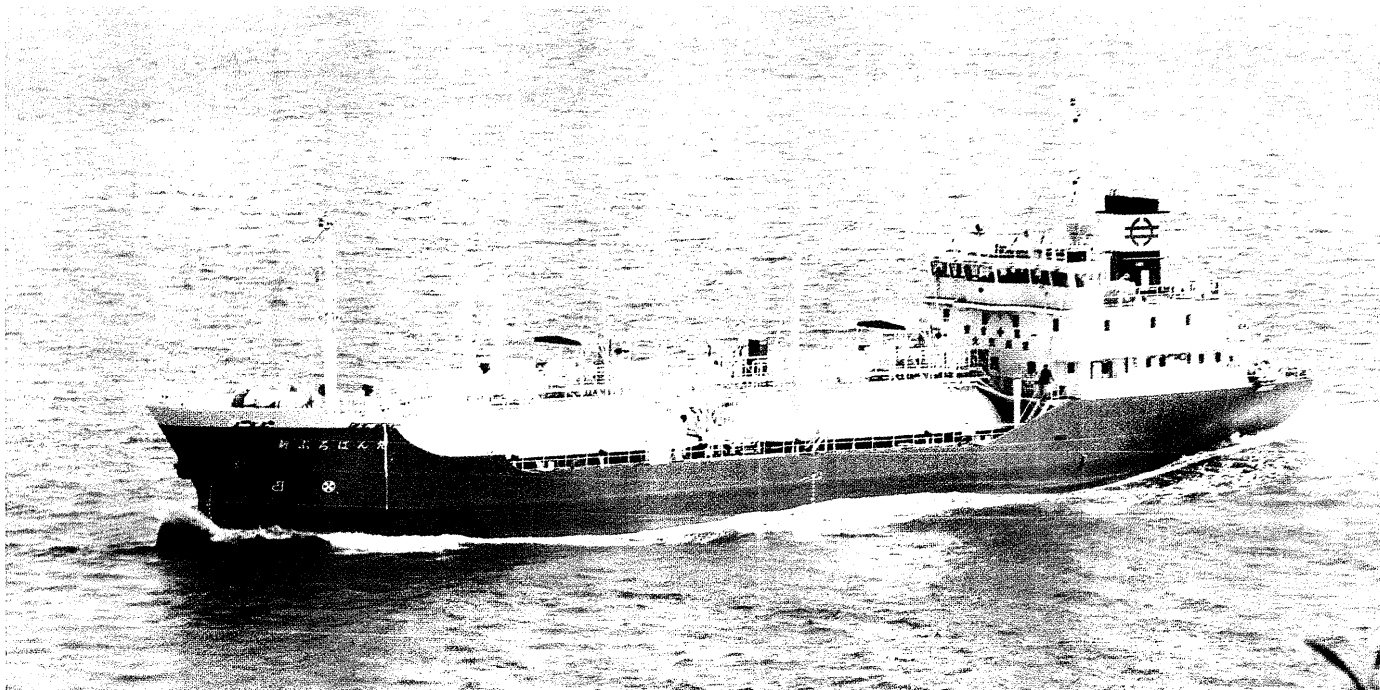


One Man Bridge Operation for Coastal Service LPG Carriers



The *Shin Propane Maru* in action

First Ship to Receive Installations Character "BRSIA"

Construction was recently completed of an LPG carrier, the *Shin Propane Maru*, which is the first ship to be given the BRSIA Installations Character by the Society. The ship is equipped with an integrated bridge system which makes one man bridge operation possible even along congested domestic coastal routes. The particulars of this ship are listed in the table at right.

Equipment and functions necessary for one man bridge operation of this ship are realized through an integrated navigation system, or INS, and serve as the basis for the awarding of the BRSIA Installations Character.

The BRSIA Character

The Society established its Rules for Navigation Bridge Systems in 1993. These Rules set forth the requirements which must be met regarding the equipment and functions necessary for one man bridge operations in order for a

ship to be awarded the BRSI Installations Character. However, the original BRSI requirements assumed one man bridge operation of a ship navigating the open seas, and as such, were inadequate for ensuring the safe navigation of a ship operating primarily along coastal routes in areas of heavy shipping traffic with only BRSI prescribed systems. Yet, as the challenge of crew reductions and the need to improve the shipboard operating environment of domestically operating ships became matters of growing concern, demand grew stronger for the establishment of criteria for domestic vessels which assumed one man bridge operation in coastal waters. Thus, the Society revised a portion of its Rules for Navigation Bridge Systems in 1996 in order to accommodate this need.

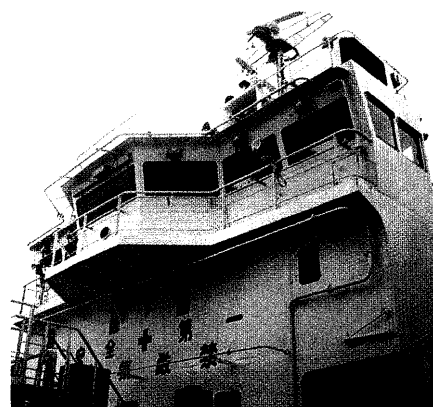
The new revisions set forth provisions for coastal service vessels operating with one man bridge systems and establish the requirements for obtaining the new BRSIA designation. Ships wishing to receive the new designation must not

only satisfy the existing requirements for the BRSI designation but must also meet additional requirements for a bridge information system (provides navigator with information, warnings, etc. necessary for operation of the ship), electronic chart display and information system (superimposes position of ship with radar information onto electronic sea chart), route tracking system (allows ship course to be maintained in accordance with previously designated course) which comprise the bridge work assist system. In addition, a cockpit type console is also required for coordinated control of the navigation and other equipment onboard. This system provides an effective way for the navigator to obtain information necessary for watchkeeping and operation of the entire ship from the location of the bridge and thus let him devote himself to these tasks more efficiently.

The Integrated Navigation System Onboard

The basic function of an integrated navigation system is to process all the information received from each navigational device in an integrated fashion, provide the navigator with timely and accurate information necessary for proper ship operation, and to assist in the effective automatic control of the ship in accordance with the course set by the navigator. Some systems have become quite sophisticated. A schematic diagram of the Super Bridge-X and related systems comprising the integrated navigation system installed on the *Shin Propane Maru* is

shown in figure 1. A special feature of INS, Super Bridge-X (manufactured by Mitsubishi Heavy Industries, Ltd., and developed through the joint efforts of government, industry and academia), is that this system uses audio input and output equipment as the main man-machine interface between the navigator and the integrated navigation system. One major advantage of this approach is that it helps to minimize the potential for human error. The integrated navigation system also has a stranding and collision avoidance function which automatically plans a route for the ship to take in order to evade such potential dangers.



External view of the bridge of the *Shin Propane Maru*

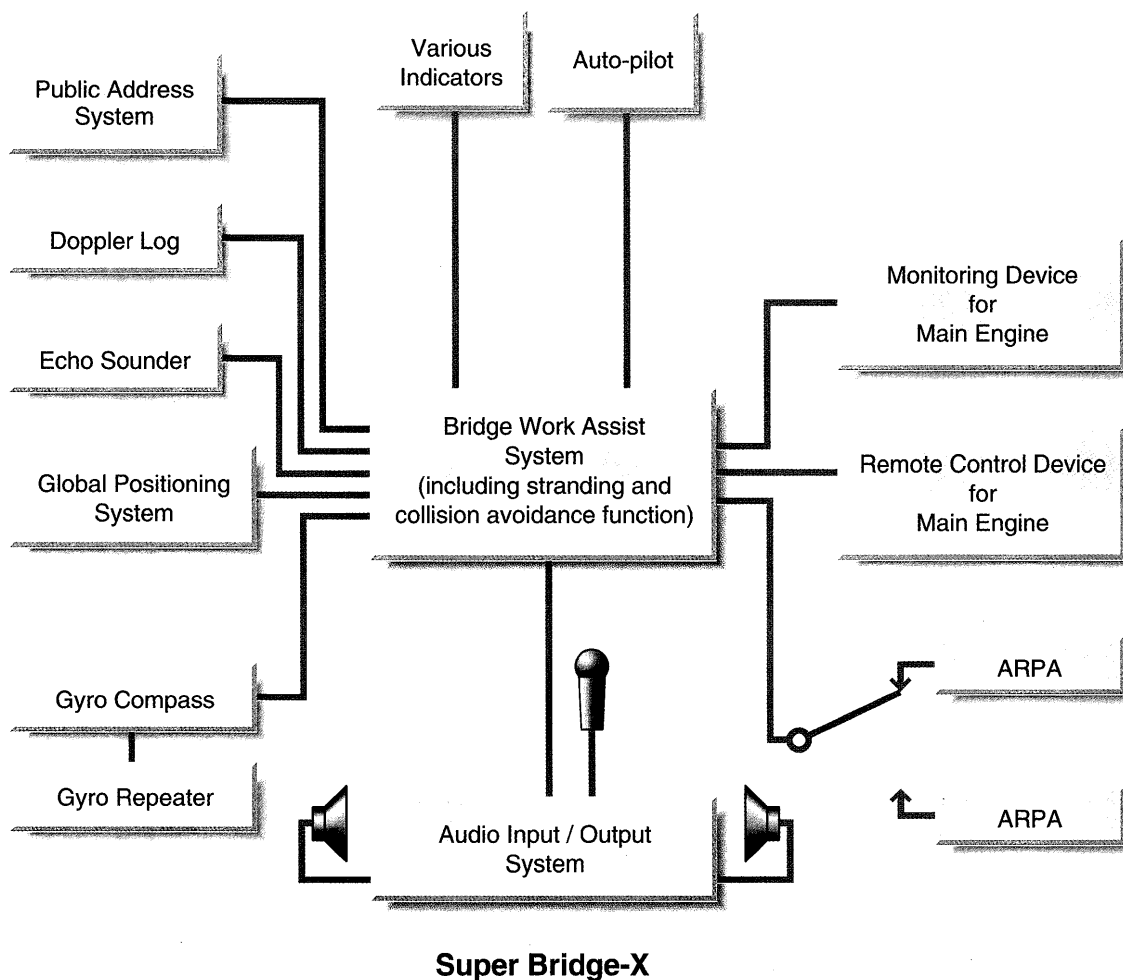


Fig.1 Schematic diagram showing relationship between Audio Input/Output and Bridge Work Assist Systems installed on the *Shin Propane Maru*

Audio Input/Output System

The audio input/output system, as mentioned earlier, serves as the man-machine interface between the navigator and the integrated navigation system.

This system enables the navigator to input what he wishes to have done by voice into the system (in Japanese, in this case), and also allows him to obtain warnings and information necessary for operating the ship from the system in audio form. Use of this system makes hands-free operation of the bridge and ship possible thereby substantially lightening the work load of the navigator. This in turn frees him from the need to perform otherwise time-consuming tasks thus alleviating some of the time and other pressures normally associated with many aspects of navigation (see box right).

A sample dialogue between the navigator and integrated navigation system via the audio input/output system in the course of controlling the ship is presented below.

- INS: Hello. It is time for the regular status report. The current bearing is xxx degrees at xx.x knots. The next point of heading change is xx.x nautical miles ahead which we are due to reach after xx minutes. Understood?
- Nav.: Understood (or OK).
- INS: There is ship xx.x nautical miles off starboard at xx degrees. Understood?
- Nav.: Understood. Is there any danger of stranding?
- INS: There is an area of stranding danger within xx.x nautical miles to the front.
- Nav.: Course xxx degrees.
- INS: Course xxx degrees. Beware!! The bow is swinging heavily.
- Nav.: Wait.
- INS: Holding present course.
- Nav.: Course xxx degrees.
- INS: Course xxx degrees.
- Nav.: Understood.
- INS: Changing course to xxx degrees.
- Nav.: Ship speed is xx.x knots.
- INS: Ship speed is xx.x knots.
- Nav.: Understood.
- INS: Set ship speed at xx.x knots.
- Nav.: North up.
- INS: Display at north up.

* Nav.: Voice of navigator. INS: Voice output of INS.



Console of integrated navigation system. The audio input/output system can be seen in the middle of the console.

Support Capabilities During Stranding or Collision

The stranding and collision avoidance function determines the degree of potential danger due to stranding and collision based on information from electronic charts and information about other ships in the vicinity obtained from ARPA (Automatic Radar Plotting Aid). In cases where there is a fear of a stranding or collision, the stranding and collision avoidance function automatically conducts a search for and plans a suitable course to evade these dangers. If it is

determined that such a danger exists, the integrated navigation system automatically begins a search for an evasion course. The most suitable route thus searched for and planned is then displayed on the electronic chart. Once the navigator verifies the route, the ship begins to change course to evade the potential danger thereby greatly facilitating safe shipboard operations. Figure 2 shows an example of an evasion route automatically planned and display by the integrated navigation system.

Conclusion

Advances in electronic technology have led to shipboard equipment rapidly becoming ever more sophisticated. The development of navigation equipment is expected to increase in pace even more in the future as demands for smaller crews onboard ship and the prevention of human error grow. Epoch-making systems such as the integrated navigation system described above will become indispensable in order that the number of persons onboard ship may be reduced without compromising the safety of ship operations.

Finally, as a classification society we would like to take this opportunity to express our appreciation for the continuing efforts of ship owners, builders, equipment manufacturers, and others to develop ever more effective systems which can contribute to improved safety at sea.

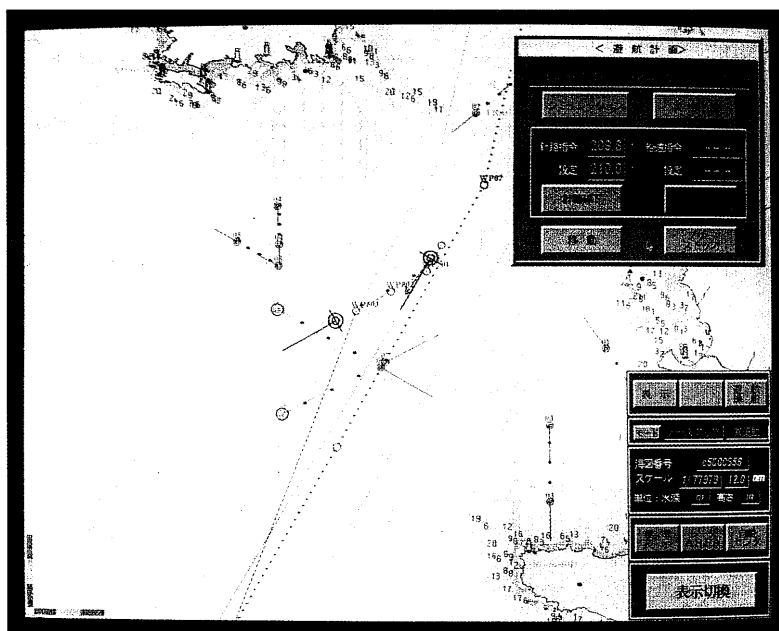


Fig. 2 Example of automatically planned evasion course shown on the route display screen. (Red line indicates planned course. Blue line indicates automatically planned evasion course.)

Principal Particulars: *Shin Propane Maru*

Shipowner:	Kyowa Marine Transportation Co., Ltd.
Shipbuilder:	Sasaki Shipbuilding Co., Ltd.
Flag:	Japan
Ship Type:	LPG Carrier
Service Area:	Coastal Service (non-international)
Length, overall:	66.10 m
Length between perpendiculars:	61.5 m
Breadth:	11.20 m
Depth:	5.00 m
Gross Tonnage:	749 t
Deadweight:	849 t
Main Engine Output (MCR):	2000 PS / 280 rpm