

Engine Room Simulator

ERS Sulzer 12RTA 84(C)

Machinery & Operation

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DOCUMENT STATUS

Issue No.	Date/Year	Inc. by	Issue No.	Date/Year	Inc. by
A	9-Sep-03	HK/beba			
B	6-Jul-05	AHE/beba			
C	21-Mar-06	AHE/beba			

CHANGES IN DOCUMENT

Issue No.	ECO No.	Paragraph No.	Paragraph Heading/ Description of Change
B	MP-1564	6	Added Auto Pulsar System
C	MP-1593	All	Major upgrade.

PREFACE

The Operators Manual contains only operator relevant information.

The purpose of Operators Manual is to provide detailed information of the vessel and the machinery modelled and on the operation of the machinery and systems.

The Operators Manual is divided into 4 parts.

Part 1 - Vessel and Machinery - Main particulars

The purpose of this part is to introduce the vessel type and main data, the configuration of the propulsion plant and of the electrical plant. Also an overview of the available service systems is included in the part.

Part 2 - Automation and Control

The purpose of Part 2 is to describe the functions and the features of the automation and the remote control systems on board the vessel.

Part 3 - Machinery and Operation

The purpose of Part 3 is to provide a comprehensive manual describing system details and giving guidelines to operating procedures of each system.

Each system includes a system drawing and a description divided into 4 parts:

- **General** - describing the purpose of the system and also including system features and international regulations when relevant.
- **Description** – describing the system details.
- **Operation procedures** – giving a detailed guideline on the operation of each system. Importance is attached to the use of appropriate and safe procedures.
- **Model particulars** – focusing on special model features or limitations to be aware of.

Part 4 – Appendixes

Appendix A Trip Codes - an overview of default trip codes of the machinery.

Appendix B Alarm list – contains all alarm tags

Appendix C Malfunction list – contains all variables.

Appendix D Variable list - contains all malfunctions that can be introduced

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Machinery & Operation

Part 1

Vessel & Machinery

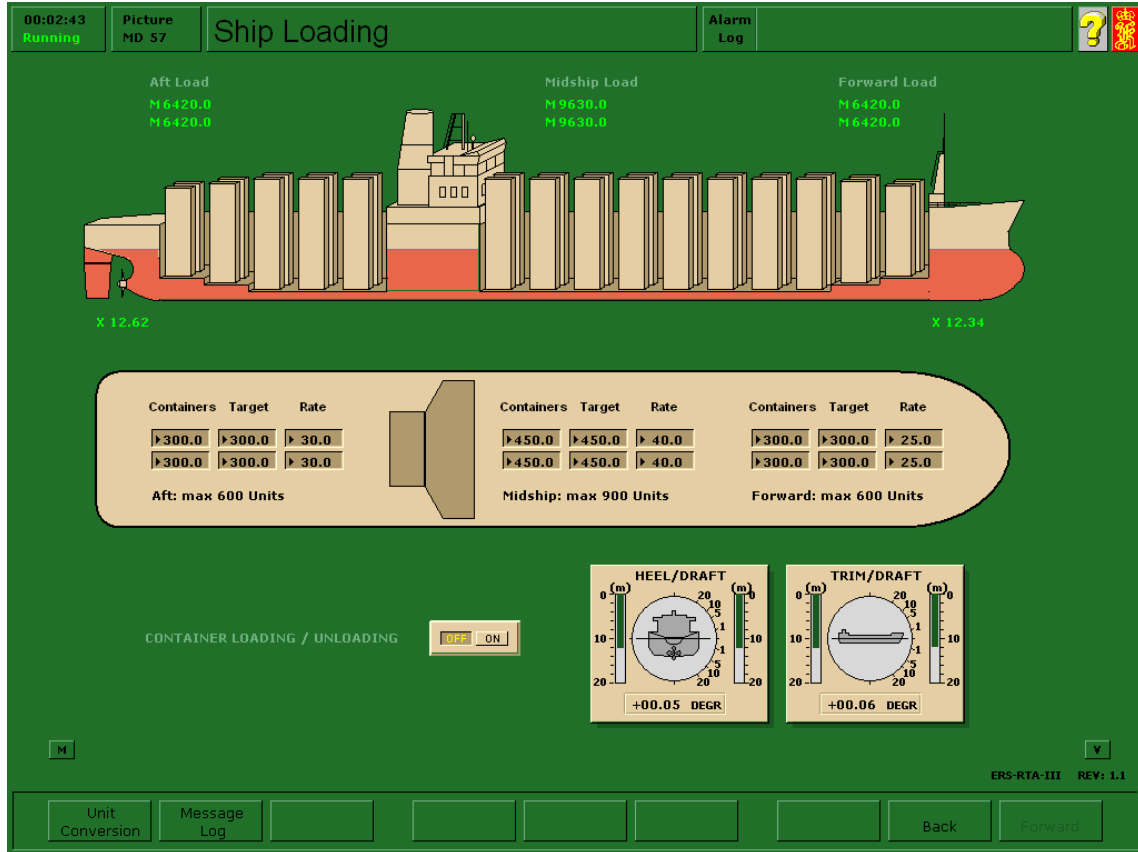
Main Particulars

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1 GENERAL DESCRIPTION

1.1 Main ship data



The ship represents a Large Container Vessel with the following main data:

- Length OA 295 m
- Length bp 281 m
- Breadth moulded 32 m
- Depth moulded 21 m
- Summer draught 12.6 m
- CB 0.60
- Dead weight 55000 tons
- Maximum container capacity 4200 TEU
- Reefer container capacity 600
- Speed knots 25

Main Engine

- Type Sulzer RTA84C
- Continuous Service Rating ME 48.6 MW
- Corresponding Engine Speed 102 rpm

Propeller System

- The propeller system includes both FPP and CPP, selectable from variable page 1940

**Electrical power plant**

- two 2300 kW/440 V/60Hz diesel engine driven synchronous generators
- two 1700 kW/440 V/60Hz diesel engine driven synchronous generators
- one 250 kW/440 V/60Hz emergency generator

Thrusters

- 1 CPP Bow Thruster 2200 kW

Steering Gear

- Double acting, rotary vane type, IMO Model

Tanks

The following main tanks are included:

- 2 HFO settling tanks
- 1 HFO service tank
- 1 DO service tank
- 1 DO settling tank
- 4 Fuel oil bunker tanks
- 1 DO bunker tank
- 1 Spill oil tank
- 1 Overflow Tank
- 1 Sludge tank
- 1 Sewage Sludge Tank
- 1 Clean bilge tank
- 1 Lubrication oil storage tank
- 2 x 6 Ballast wing tank
- 1 Fore peak tank
- 1 Aft Peak Tank

2 ALARM, MONITORING AND REMOTE CONTROL SYSTEM

The alarm, monitoring and remote control is handled by the following modules:

- The **DataChief** module for general alarm and monitoring of machinery and vessel.
- The **AutoChief** module for remote control and management of the propulsion plant.
- The **PowerChief – Generator Control** module for remote control and management of the generators.
- The **PowerChief – Pump and Compressor Control** module for remote control and management of the pumps and air compressors.

The DataChief consists of one (or more) high-resolution graphic workstation with a dedicated keyboard.

Alarms are announced by an audible signal and the alarm group is indicated in the upper part of the monitor. Alarm log, alarm acknowledgement and general alarm handling is described in a separate section in the document.

The DataChief also act as the operator station. All functions incorporated in a general workstation, such as mimic drawings, trend system, PID Controllers, general numeric indicators, status signal and alarm limits are available.

The AutoChief is handled from a separate AutoChief panel.

The Power Chief – Generator Control and the PowerChief - Pump and Compressor Control modules may be operated from a separate panel (if applied) or directly from the DataChief operator station.



3 PROPULSION PLANT

3.1 Main engine data

The propulsion machinery is based on one Sulzer RTA84C, low speed, 12 cylinder configuration, 2-stroke, turbocharged, reversible diesel engine. The main engine is coupled to a propeller shaft with both fixed pitch propeller and controllable pitch propeller (selectable by the instructor).

Main engine particulars

- Cyl Bore 840 mm
- Piston Stroke 2400 mm
- Number of Cylinders 12
- Number of Air Coolers 3
- Number of Turbo Chargers 3
- Continuous Service Rating ME 48.6 MW
- Corresponding Engine Speed 102 rpm
- Mean Indicated Pressure 18.4 Bar
- Scavenge Air Pressure 2.30 Bar
- Turbine Speed 8800 rpm
- Number of Prop. Blades 5
- Propeller Pitch 1.08 P/D
- Specific Fuel Oil Consumption 171 g/kwh

The main engine is equipped with the following auxiliary systems:

- HTFW cooling system including pre-heating system.
- LTFW cooling system
- Fuel oil high pressure system
- Main lubrication oil system
- Turbocharger and scavenging air cooling system.
- Manoeuvring system.

The propeller system includes:

- Propeller servo system
- Stern tube lubrication oil system
- Steering gear system

3.2 Main propulsion plant - Operation and control modes

When remote controlled from the engine control room or from the bridge control panel, the AutoChief controls the propulsion plant.

The main engines may be operated in two different modes, selectable by the instructor.

The modes are:

- Combinator for CPP operation
- Fixed pitch

The main engine may also be operated with variable ignition timing, VIT, and/or variable exhaust closing, VEC.

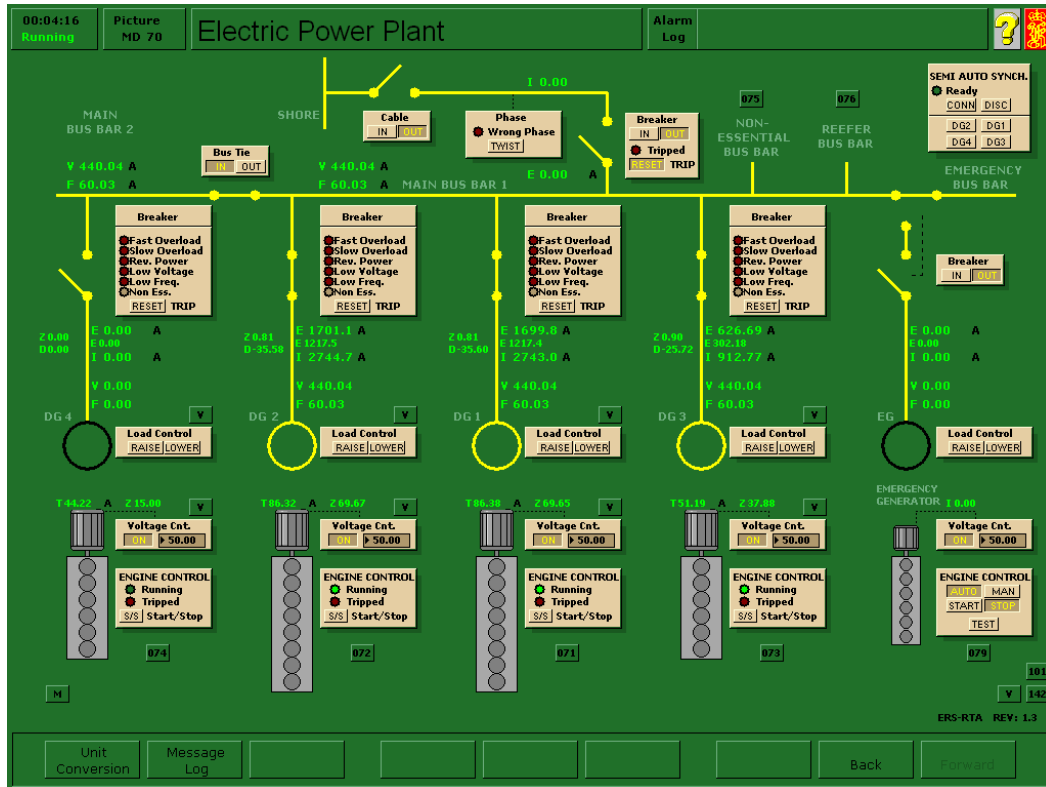
The AutoChief also handles the propulsion plant safety and overload control system including:

- Slow down and shut down functions for the main engine
- Main engine load limitations (scavenge air pressure and torque control)
- Thermal limitations
- Overload control of main engine



4 ELECTRICAL POWER PLANT

4.1 Electrical power supply



The ship's electric power is generated by:

- two 2300 kW/440V/60Hz, 720 rpm diesel engine driven synchronous generators - diesel generator 1 (DG1) and diesel generator 2 (DG2)
- two 1700 kW/440V/60Hz, 720 rpm diesel engine driven synchronous generators - diesel generator 3 (DG1) and diesel generator 4 (DG2)
- one 250 kW/440V/60Hz emergency generator

Distributed via:

- one main switchboard, divided into two main 440V bus bars
- one emergency bus bar

Bus bar 1 powers all the electrical main consumers and the emergency bus bar.

Bus bar 2 powers the bow thruster and deck machinery.

Lightning panels, control consoles and various 220v consumers are supplied from bus bar 1 via two 440v/220v transformers.

4.2 Main switchboard functions

Main switchboard functions

The main switchboard functions includes all controls and indicators usually available on real switchboards.

Each of the generator sections contains meters for V, A, kW, kVAr and Hz. A selector switch enables the reading of the separate phases.

Voltage control

The field voltage (magnetisation)-setting device enables voltage control and balancing between active and reactive load when the generators are operating in parallel. AVR settings are available in the pop-up window.

RPM control

The rpm of each generator can be adjusted from the main switchboard load control push buttons. The Speed Controller (Governor) can be accessed from the pop-up window.

Generator breakers

Automatic disconnection of the generators from the bus bar is activated by the following functions:

- Fast overload of generator
- Slow overload of generator
- Reversed power
- Low voltage
- Low frequency

The breaker also activates non essential consumer trip

4.3 Emergency generator

The emergency generator is arranged for automatic start and connection to the emergency switchboard in the event of failure of normal supply from bus bar 1.

In the event of low voltage at bus bar 1 the following sequence will take place, provided that the emergency generator is in AUTO:

1. The emergency generator is started
2. The emergency bus-tie breaker is opened
3. The emergency generator is connected to the emergency bus bar.

When the voltage at bus bar 1 is re-established the sequence is

1. The emergency generator circuit breaker is disconnected
2. The emergency tie- line breaker is closed
3. The emergency generator stops after a few minutes of idling.

The emergency switchboard is equipped with a **TEST** button. If the TEST button is activated a zero-voltage at the bus bar is simulated. The emergency generator start, connect and feed the emergency bus bar.

NOTE

It is not possible to run the emergency generator in parallel with the main generators.

4.4 Shore power

Bus bar 1 is supplied from shore connection via the shore cable and the shore connection circuit breaker. The maximum electric load obtained via the shore connection is 3600 kW. At cable connection, the electric phase will be chosen at random. A rotating light-wheel indicates the phase sequence. Clockwise rotation is correct. Pressing the “WRONG PHASE” button simulates a corrective phase change and the shore connection can be set.

5 SERVICE SYSTEMS

All service systems can be operated from the operator station or locally from the engine room. The following machinery and systems are included:

- Sea water system
- Ballast system
- Fresh water system
- Bunkering system
- Fuel oil transfer system
- Fuel oil settling tanks
- Fuel oil supply system
- Fuel oil service tanks
- Fuel oil separators system
- Diesel oil separator system
- Lubrication oil purifier system
- Start air compressor system
- Service air compressor system
- Sewage treatment plant
- Incinerator plant
- Air ventilation system
- Cathodic protection system
- Marine growth prevention system
- Fresh water generator
- Bilge system including bilge separator
- Refrigerating system
- Steam system
- Container loading system
- Reefer containers system
- Battery charging system