

Distributed Processing Units (DPUs)

A number of different Distributed Processing Units are available for different tasks. The main functions of the DPUs are to monitor analogue or digital sensors, and to provide analogue and digital output to various devices. All units have the same mechanical construction and are built using the same electronic design principles.

The main characteristics of the DPUs are:

- LED indicators on the housing for watch-dog, run status, general information, unit initialization and power polarity
- Three-way isolation between I/O to power, I/O to process-bus and power to process-bus
- Single printed circuit board design
- Easy service replacement without setting trimmers, dip switches, jumpers or sockets
- No additional EMC protection required (only IP)
- Time synchronisation
- Non-volatile memory
- Remote alarms function
- Dual CAN-bus interfaces
- Software can be downloaded into the unit
- Built In Self-Test (BIST) monitoring temperature, power and

- sensor excitation overload
- All parameters are stored in each unit
- Each unit is remotely configurable
- No serviceable parts inside
- All connections are pluggable

Engine Safety Unit (ESU)

The ESU is a module with digital inputs and outputs. Some of the digital inputs are directly connected to the solenoid outputs. All inputs can be used to activate outputs and the values are also reported on CAN.

Remote Analogue Input (RAi-16)

This analogue input module is a multi-purpose flexible device that covers the most common input signal types in a marine automation system, such as voltage, current and resistance in different ranges.

Remote Analogue Input (RAi-10tc)

This analogue input module is specially designed for temperature measurements with TC elements of different types. A large variety of different elements can be connected.

Digital Output Unit (RDo-16)

This digital output module is a multi-purpose flexible device that covers the

most common output signal types in a marine automation system.

Distributed Generic Unit (DGU)

This module is designed to communicate with external equipment on a serial line or CAN, and to communicate with ACPs on the global CAN.

Local cabinet

The local cabinet will include all modules required for interface of the engine through the PowerStar™. It also includes the MOS and an Emergency Stop switch. A rubber cable gland plate is mounted at the bottom, securing access for cables to and from the cabinet. The cabinet is certified to be mounted in the Engine Room, but is not designed to be mounted directly on the engine. (Note that all modules and the MOS are certified to be engine-mounted.)



Integration to an alarm and monitoring system

The AutoChief C20 Engine Control System is a master for communication towards the PowerStar EGU. The ECS will ask for data, which has to be transmitted on request from the EGU. It is possible for the makers of alarm and monitoring systems to connect to the communication module and receive the same data.



Note!

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AutoChief® C20



Engine control and monitoring for General Electric



System description

The engine control and monitoring system is as a stand-alone control system for General Electric (GE) diesel engines used in marine propulsion applications. The modular design of the system allows interfacing to the Kongsberg Maritime AutoChief® propulsion control system. This is a complete control and safety system for slow and medium speed propulsion motors with fixed and controllable pitch propellers, including functionality for gear control, clutch control, thruster

control and so on.

The GE system solution described herewith includes the following functions:

- Alarm monitoring and control system for General Electric (GE) PowerStar™ Electronic Fuel Injection Control (EFI)
- Alarms and status received via a serial interface (MODBUS)
- Start and stop of engine locally
- Start and stop of pre-lube pump
- Transfer of speed control to Remote Control System (RCS)
- Shutdown safety function with

direct interface of specified sensors

- Displaying of engine temperatures and pressures with bargraph displays
- Displaying of exhaust temperatures for maximum 19 sensors via serial line or as individual signals

The system is based on Kongsberg Maritime's unified automation concept, where each individual ship configuration is built up using standard modules communicating on CAN and LAN networks.

System functions

The following main system functions are integrated parts of the AutoChief® C20 for GE:

- Engine control system functions
- Safety system functions

Engine control Start interlocks

The “Start Intl.” indicator in the upper left corner of the home display indicates that the engine cannot be started before the start interlock function is deactivated.

Pre-lubrication

Prior to start, the engine has to be pre-lubricated. The pre-lube is activated by the MOS. It is stopped by the PowerStar™ EFI controller when the

oil pressure has raised above a pre-set level and a timer of 2 minutes has elapsed.

Blowdown

This function is used for cranking the engine without starting it. The engine will be cranked as long as the blow down function key is pressed.

Starting the engine

The engine is started by the operator activating a function key on the MOS. Prior to this, a start permissive signal has to be received from the PowerStar™ EFI controller.

The starter is activated by opening a solenoid valve supplying air to the starter motor. The starter is On as long as the Start function key is active.

Speed increase/speed decrease

There are functional keys for local speed-setting of the engine. When the engine is running, the speed may be adjusted up and down by the activation of these keys. The speed will be adjusted as long as the key is pressed.

Remote/local

There are function keys for selecting Remote/Local. To be able to start, pre-lube or blowdown the engine, the MOS has to indicate “Local”.

Stopping the engine

The engine is stopped by the operator by activating a function key on the MOS.

The engine may also be stopped by activating emergency stop.

Operational Limiters

All fuel and load limiters required for the operation of this engine is taken care of by the PowerStar™ EFI controller.

Safety Shutdown

Shutdown is taken care of by the PowerStar™ EFI controller, and in parallel the ACC20 ECS control system. The engine will automatically shutdown (stop) if any of the shutdown sensors are activated, or if one of the emergency stop switches are activated. Shutdown is reset in local control (after the sensor is de-activated) by activating a function key on the MOS.

Reversing/reduction gear shutdown

There are two inputs from sensors on the reversing/reduction gear reserved, causing the engine to shutdown;

- Low oil pressure reversing/reduction gear (option)
- Low oil level reversing/reduction gear (option)

Emergency stop

The emergency stop push-buttons are hardwired directly into the Engine Safety Unit (ESU). Four emergency stop push-buttons may be used:

- On the Bridge - 1 push-button with light integrated in the bridge console (option)
- On the aft Bridge - 1 push-button with light integrated in a console (option)
- In the Engine Control Room - 1 push-button with light and cover integrated in ECR console (option)
- At local stand - 1 push-button with light and cover integrated in the local cabinet

Emergency stop is directly activated through the ACC20 Engine Control System when one of the push-buttons is activated.

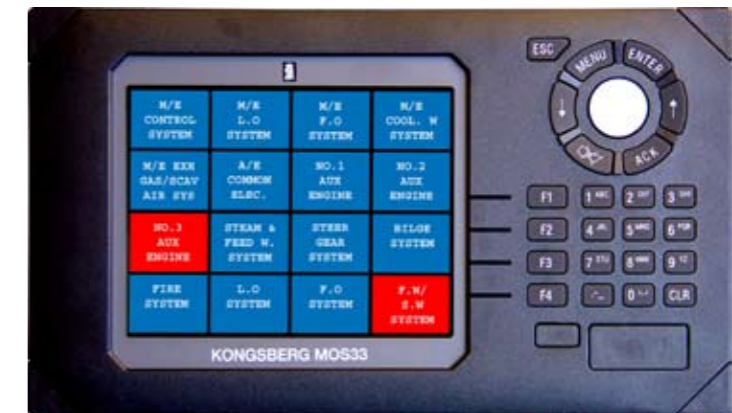
Over-speed shutdown

The ACC20 Engine Control System does not include over-speed protection, as this is taken care of by the PowerStar™ EFI controller. Over-speed alarms will be shown on the MOS.

System units

Midi Operator Station (MOS)

The Midi Operator Station (MOS) is a multi-purpose operator station designed to be placed anywhere on the ship, even out on deck. It allows alarm indication, process control and power management. Operation is performed through a set of function keys and a high resolution colour graphical display.



The MOS will give the operator the possibility to:

- Monitor the status of an object, all from a single input signal to a controllable object
- Be informed of any process or system alarm, by means of visual and audible signals
- Interface to a printer for alarm logging purposes
- Reconfiguration of the distributed database located in the DPUs by means of numeric and alphanumeric inputs

A colour display presents key information graphically for easy understanding. The Home display is used to perform the main tasks, for example Start/Stop of the pre-lube pumps and Start/Stop of the engine. The most important information, such as Main Engine RPM, load oil pressure and cooling water

temperature, are always available.

All exhaust temperatures are monitored in the MOS standard bargraph display system. Analogue signals monitored by the MOS are indicated as standard bargraph displays. Six cylinders or six measuring points are visible at any time, but the scroll-down menu can be used to view the remainder.

Alarms from the engine will be transmitted via an RS-485 serial line using the MODBUS protocol. Additionally, sensors from auxiliary systems can be connected directly to the DPUs in the local cabinet. The appurtenant alarms will be displayed on the MOS.

All alarms are sorted in alarm groups and displayed on the MOS in the alarm group view. When one or more groups have active alarms, the group symbol will be coloured red.

