



Lyngsø Marine A/S

DMS2100i Bridge Manoeuvring System

MAN B&W MC/MC-C Engines

User Manual

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1. DMS2100i Introduction

The Diesel Manoeuvring System - DMS2100i is a Bridge Manoeuvring System used for remote control of a ship's Propulsion Line, with a two-stroke low speed Main Engine connected to a Fixed Pitch Propeller (FPP).

The DMS2100i is operated by means of Telegraph Levers and standard DMS2100i Panels with build in four-line display.

The DMS2100i is operated as a completely independent stand-alone system, with all information and internal alarms displayed on the DMS Operator Panels.

When the DMS2100i are delivered together with a Lyngsø Marine Universal Monitoring System, UMS2100 alarm system or as an integrated part of the Universal Control System UCS2100, the systems can be interconnected by means of a communication network, so that alarms, indications and measurements values from the DMS2100i can be displayed on the Graphical Operator Station (GOS) and alarm Panels in the Alarm and Control System also.

The DMS2100i can be configured to provide complete control for:

- Main Engine Start/Stop System
- Start Blocking indications
- Main Engine Setpoint System
- Main Engine Shutdown Indications from ME Safety System
- Main Engine Slowdown System
- Main Engine Speed Measurement and Indication
- Control Transfer for Bridge/ECR/Local Change-over
- Sub-telegraph with Finished With Engine (FWE), Stand-by and Sea-mode
- Serial Interface to EGS2000 Electronic Governor
- Alarm Announcement and Indication

The DMS2100i can be extended with the following options:

- DPS2100 Engine Safety System (independent system for Shutdowns and overspeed)
- Interface to PTO connected Shaft Generator (SG Waiting Station)
- Bridge Wing Control (Wing Panels Optional) and Electric Shaft on Telegraph Levers
- Communication Telegraph System for Bridge order communication to ECR/Local
- Manoeuvring Order Printer integrated in the system
- Integration with Lyngsø Marine Alarm and Control System
- Serial interface (Modbus) to other types of ships alarm system

This User Manual gives an overview of the hardware and describes the functionality of the DMS2100i Bridge Manoeuvring System, and includes wiring diagrams etc.

Also the Monitoring and Control System, the Safety System, the Telegraph Lever System with Electric Shaft for the Bridge Wings and other related system and options are described to give a complete overview of the remote control system.

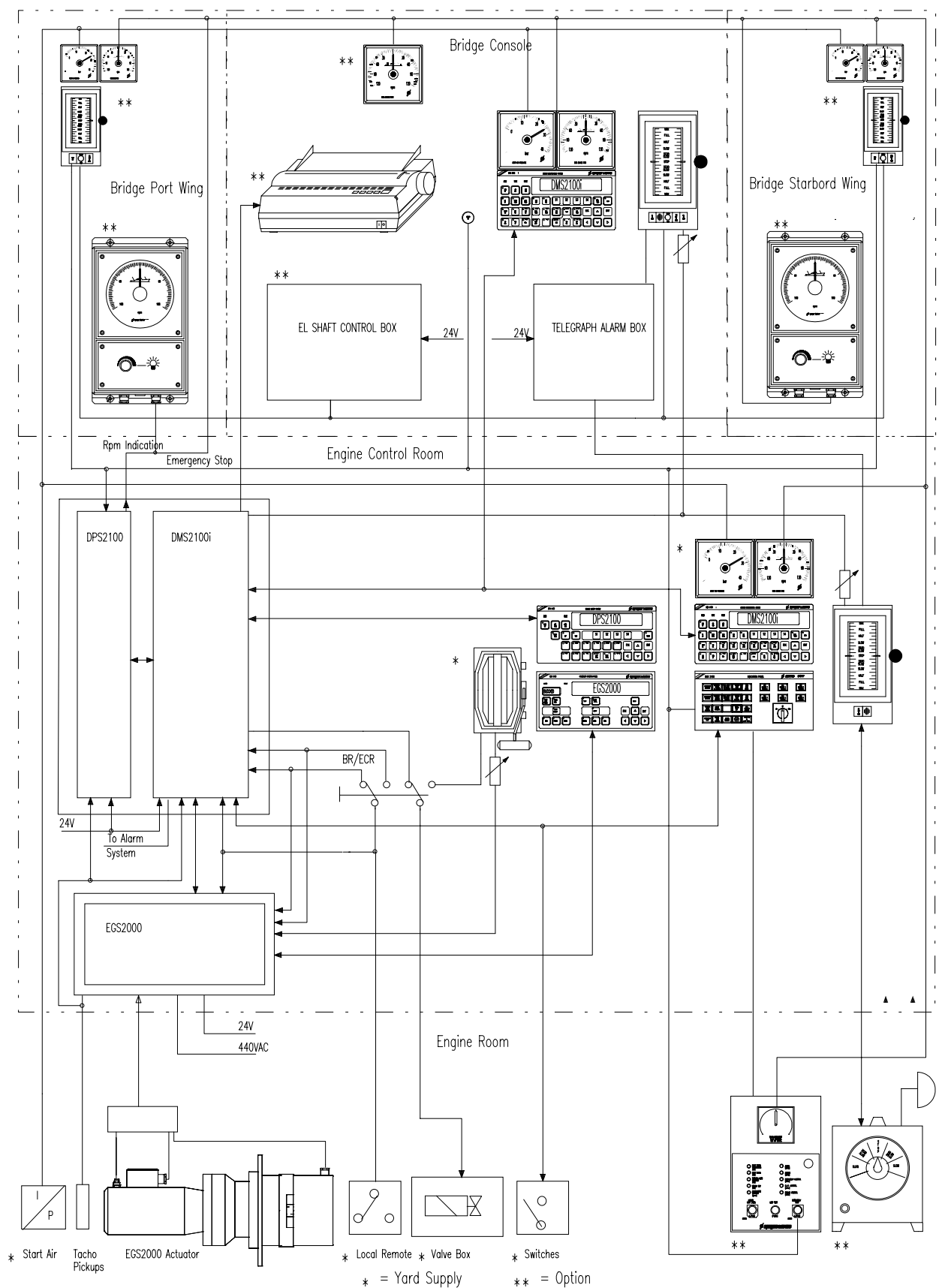


Figure 1: Bridge Manoeuvring System, DMS2100i layout.

1.1 References

- [1] Propulsion Control System, PCS2100, System Description
- [2] Diesel Protection System, DPS2100, System Description and User Manual
- [3] Universal Monitoring System, UMS2100, System Description and User Manual
- [4] Universal Control System, UCS2100, System Description and User Manual
- [5] Electronic Governor System, EGS2000, System Description and User Manual

1.2 Definitions and Abbreviations

AAM	Analog Output Module type 401
AEM	Analog Input Module type 402
AI-CB	Analog Input Connection Board (in EGS2000)
AI	Analog Input
AO	Analog Output
BAP	Basic Alarm Panel
BRG	Bridge
BT	Bow Thruster
CPP	Controllable Pitch Propeller
DG	Diesel Generator
DI	Digital Input
DO	Digital Output
DMS	Diesel Manoeuvring System - Bridge Manoeuvring System
DNM	Dual STELLA NET communication interface Module
DPS	Diesel Protection System - Engine Safety System
DSN	Dual STELLA NET communication interface
DZM	DrehZahl relais Module - speed relay module type 402
ECR	Engine Control Room
EGS	Electronic Governor System
EMG	Emergency
ENT	Enter key
ER	Engine Room
ESC	Escape key
ESS	Engine Safety System
EXH	Exhaust
FIM 405	Filter Module for 24 Vdc Power Supply
FPP	Fixed Pitch Propeller
GOS	Graphic Operator Station
I/O	Input/Output
I/P	Current to Pressure converter
IOM	Input Output Module - type 402
LC	Local Control
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LOP	Local Operator Panel
LP	Lowpass Filter
LM	Lyngsø Marine
MAM	MIC40 Input/Output Adapter, Gamma to digital I/O modules

ME	Main Engine
MEP	Mean Effective Cylinder Pressure
MIC40	Input/Output Adapter, Gamma to digital I/O modules
MSB	Main Switch Board
MXM	Multiplexer Module type 402 (16 channel analog input)
NA	Not Applicable
PCC	Propulsion Control Cabinet
PCS	Propulsion Control System
PLC	Programmable Logic Controller - Gamma computer
PMS	Power Management System - ships generator control system
PS	Port Side
PTO	Power Take Off
REM	Binary input and relay output module type 401
RPM	Rotations Per Minute
SB	Star Board side
SG	Shaft Generator
SHD	Shutdown
SIM	Serial Input/Output Interface Module
SIO	Serial Input/Output Communication
SLD	Slowdown
ST	Stern Thruster
TAM	Tacho Adapter Module type 401
TC	Turbo Charger
UPS	Uninterruptable Power Supply
UMS	Universal Monitoring System - ships alarm system
UCS	Universal Control System- ships alarm and control system
VIC/T	Variable Injection Control/Timing

2. DMS2100i System Overview

The DMS2100i control functions for a Propulsion Line existing of a MAN B&W 2-stroke Slow-speed Engine with Fixed Pitch Propeller are handled by one DMS2100i Gamma PLC mounted in the DMS control cabinet, together with the units for a DPS2100 Engine Safety System.

The Main Engine Safety System is completely independent of the DMS. The Main Engine may be equipped with a standard Safety System from the Main Engine manufacturer. If the Main Engine manufacturer supply does not include a Safety System, the DMS can be delivered together with an independent Diesel Protection System, DPS2100 Safety System.

The alarm and monitoring part of the machinery components controlled by the DMS2100i are handled by other Gamma PLC's in the UMS/UCS2100 Alarm and Control System.

In case that alarms from the Main Engine are connected to the DMS Gamma, it must be alarms relevant for the Main Engine controlled by that particular DMS Gamma only, because they will be displayed as DMS alarms on the DMS Panels, such as e.g. alarms initiating a Slowdown/load reduction, startblockings etc.

The DMS2100i and the UCS2100 Alarm and Control system are independent systems, each with its own Gamma PLC's, only connected by a network to transfer alarms and information to the GOS and printers (Manoeuvring Order Printer). The network will also be used for automatic operation of the Power Management System (PMS) e.g. in case of mode change to/from a mode where the SG is connected to a Bow Thruster (BT) and/or Stern Thruster (ST).

Slowdowns for the Main Engine and optional RPM up/down signals from the Power Management System (for frequency control, load sharing and synchronising purposes) are transferred as hardwired signal lines for safety reasons. The Slowdown inputs to the DMS2100i are defined as supervised inputs, i.e. cable break can be detected.

All hardware component and logic circuitry of the DMS2100i and the UCS2100 Alarm and Control System is independent. That means it will still be possible to control the propulsion machinery even in case of a total breakdown of the Alarm and Monitoring System.

The power supply for the DMS2100i as well as the DPS2100 and UCS2100 must be Uninterruptable Power Supply (UPS) protected. There must be a separate fuse for the DMS2100i Gamma, the DPS PLC and the remaining hardware connected to this system.

The following part of the remote control system are described in this section:

- DMS2100i Main Cabinet (Gamma PLC, I/O Modules etc.)
- DMS Panels for remote control of the propulsion machinery
- ECR Sub Panel for Manual ECR Control of the propulsion machinery
- Local Control Box for Local Control of the propulsion machinery
- DPS2100 Engine Safety System
- Telegraph Lever System
- Electric Shaft for Bridge Wings control
- Communication Telegraph System
- Main Engine Speed Measurement

2.1 DMS Panels for Remote Control

For operation of a ship's Propulsion Line, the DMS is connected with DMS operator panels on all control locations, including instruments for RPM and Start air pressure indication and a pushbutton for Emergency stop:

- one in the Engine Control Room (ECR)
- one on the Bridge
- two panels on the Bridge starboard and Port Wings (optional)
- a fifth panel can be mounted on an Aft Bridge (optional)

The DMS Panel is mounted together with a Setpoint Lever on all Control Locations with DMS Control, i.e. normally Bridge and ECR, and optionally on the Bridge Wings.

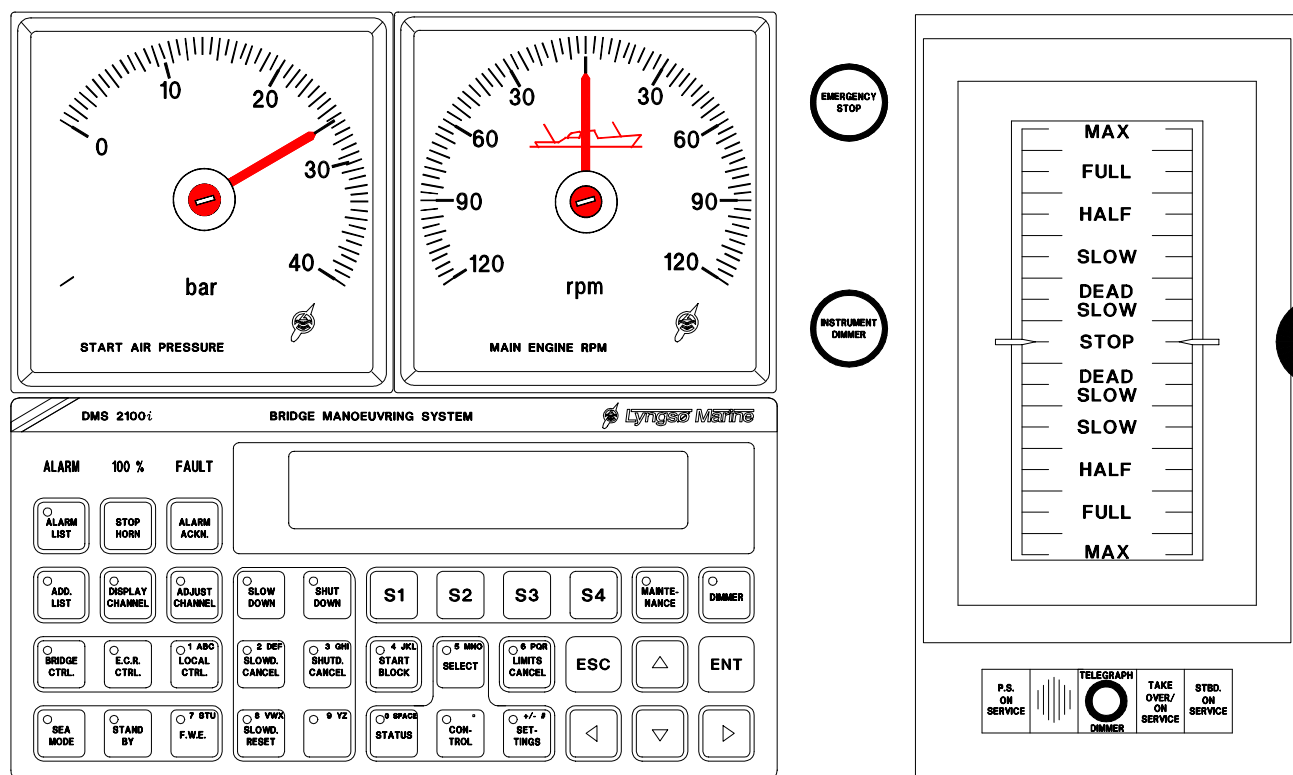


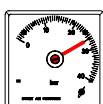
Figure 2.1: DMS Panel, Telegraph and Instruments for Bridge and ECR Control Locations.

2.1.1 DMS Panel Functions

The following main functions are available on each control location for the Main Engine/Propulsion Line:



Analog instruments for indication of ME RPM



Analog instruments for indication of ME Start Air pressure.

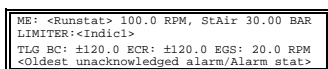


Dimmer potentiometer for illumination of the analog instruments (Bridge only)

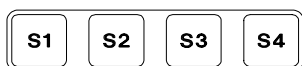


Emergency stop pushbutton with cover.

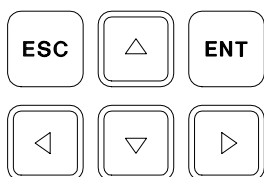
DMS2100i Operation Panel with the following functions:



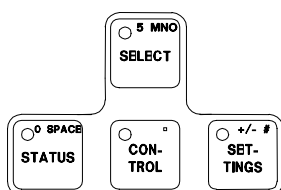
Four lines display with 40 characters on each line



Softkeys [S1] - [S4] for operation of DMS functions



Six selection keys: [ESC], [ENT]
and four [Arrow] keys



[Select] of DMS control functions of
[Status], [Control] and [Settings]

Control location selection and indication for:



[**Bridge Ctrl.**] key for indication and Request / Acknowledge of Automatic Bridge.
References: Chapter 3.1.1



[**E.C.R. Control**] key for indication and Request / Acknowledge of ECR Control Station (Automatic Remote or Manual Remote Control).
References: Chapter 3.1.3



[**Local Ctrl.**] key for indication and Acknowledge of Local (Emergency) Control Station.
References: Chapter 3.1.9

SUB-Telegraph selection and indication for:



[**Sea Mode**] operation and indication key:
Activation of this key orders Sea Mode and alarm for this is released.
Mode conditions: Control air on, Safety air on, Main start valve not blocked, Starting air distributor not blocked and Turning gear not engaged.
When unacknowledged or conditions not fulfilled, the green LED is flashing.
When Sea Mode is present, the green LED is ON.
References: Chapter 3.2.3



[**Stand By**] operation and indication key:
Activation of this key orders Stand By at the Main Engine and alarm for this is released.
Mode conditions: Control air pressure on, Safety air pressure on, Main start valve not blocked, Starting air distributor not blocked and Turning gear not engaged.
When unacknowledged or conditions not fulfilled, the green LED is flashing.
When Stand By is present, the green LED is ON.
References: Chapter 3.2.2



[**F.W.E.**] operation and indication key:
Activation of this key orders Finished With Engine and alarm for this is released.
Mode conditions: Control air pressure off, Safety air pressure off and Main start valve blocked.
When unacknowledged or conditions not fulfilled, the green LED is flashing.
When Finished With Engine is present, the green LED is ON.
References: Chapter 3.2.1



[**Slow Down**] operation and indication key:
Activation of the key invokes the Slowdown status list at the LCD display.
When Slowdown is active, the red LED is ON.
References: Chapter 3.5.



[**Slowd. Cancel**] operation and indication key:
Slowdown may be cancelled, when in Automatic Bridge or Automatic ECR control.
When in Manual ECR Control operation takes place from the DMS as well.
When Slowdown prewarning is present, the red LED is flashing.
When the Slowdown situation is cancelled, the red LED is ON.
References: Chapter 3.5.



[**Slowd. Reset**] operation and indication key:
Slowdown may be reset, when in Automatic Bridge or Automatic ECR control and the Slowdown condition is neither present nor cancelled.
When in Manual ECR Control operation takes place from the DMS as well.
When Slowdown may be reset due to Sl.d. condition back to normal or cancelled the red LED is flashing.
References: Chapter 3.5.



[**Shut Down**] operation and indication key:
Activation of the key invokes the Shutdown status list at the LCD display.
When Shutdown is active, the red LED is ON.
References: Chapter 3.4 and DPS2100 User Manual.



[**Shutd. Cancel**] operation and indication key:
Shutdown may be cancelled, when in Automatic Bridge or Automatic ECR control.
When in Manual ECR Control operation takes place from the DPS2100 Control Panel in ECR.
When Shutdown prewarning is present, the red LED is flashing.
When the Shutdown situation is cancelled, the red LED is ON.
References: Chapter 3.4 and DPS2100 User Manual.

The [**RESET**] and [**CANCEL**] keys for Shutdown and Slowdown keys are only working on the DMS Panels which are in control, i.e. on anyone of the Bridge Panels in Bridge Control and on the ECR Panel in Automatic ECR Control, however the Slowdown Reset can be configured to always have reset from the E.C.R. Panel.



[**Start Block**] operation and indication key:
Activation of the key invokes the Startblocking status list at the LCD display.
When Startblocking is present, the red LED is ON.



[**Limits Cancel**] operation and indication key:
Activation of this key Cancels the RPM Max Limit of the DMS2100i as well as Index Limiters / OPS Limiters and RPM Loadprogram of the EGS2000.
Optionally activation of this key Cancels Startblockings.
Optionally activation of this key Cancels Slowdown.
When Cancellation is present, the red LED is ON.
The [**Limits Cancel**] key is only working on the DMS Panels which are in control, i.e. on anyone of the Bridge Panels in Bridge Control and on the ECR Panel in Automatic ECR Control.

UMS2100 keys for alarm functions in the DMS Gamma:



[**Stop Horn**] operation key:
Activation of this key stops the buzzer in the Operating Panel.



[**Alarm Acknowledge**] operation key:
Activation of this key acknowledges the alarms present at the LCD display of the Operating Panel.

The [**Stop Horn**] and alarm [**Alarm Ackn.**] keys can be configured to work on several different conditions:

1. Both keys are always working in the ECR, e.g. when the Chief Engineer always wants to be able to acknowledge alarms. Buzzer and [**Stop Horn**] are working on anyone of the Bridge Panels for all alarms announced on the bridge (configurable), but [**Alarm Ackn.**] will not be possible on the Bridge.
2. Both keys are working on the present DMS Control Location, i.e. working on anyone of the Bridge Panels in Bridge Control and on the ECR Panel in ECR Control.

In connection with an integrated UMS alarm system, where the Watch Station can be changed to the Bridge, the function of both keys are following the UMS Watch Station.



[**Alarm List**] operation and indication key:
References: Chapter 5.3.



[**Additional List**] operation and indication key:
References: Chapter 5.4.



[**Display Channel**] operation and indication key:
References: Chapter 5.5.



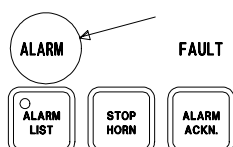
[**Adjust Channel**] operation and indication key:
References: Chapter 5.6.



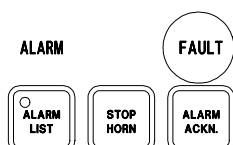
[**Maintenance**] operation and indication key:
References: Chapter 5.7.



[**Dimmer**] operation and indication key:
References: Chapter 5.8.



[**Alarm**] indication lamp for DMS2100i Alarm detected.
Any DMS2100i alarm in chapter 6 activates this indication.



[**Fault**] indication lamp for DMS2100i Panel in Faulty condition,
e.g. missing communication to the Gamma Micro CPU or missing EPROM inside the panel.

Please refer to chapter 5 and the UMS2100 System Description for further information about the alarm system functions.

2.2 The ECR Sub Panel

The ECR Sub Panel is installed in the ECR Console next to the Operating Panel. This panel is installed, if the optional Manual ECR Control is provided. It consists of several operating and indication facilities in order to handle the engine in manual ECR control - see Fig. 2.2 below:

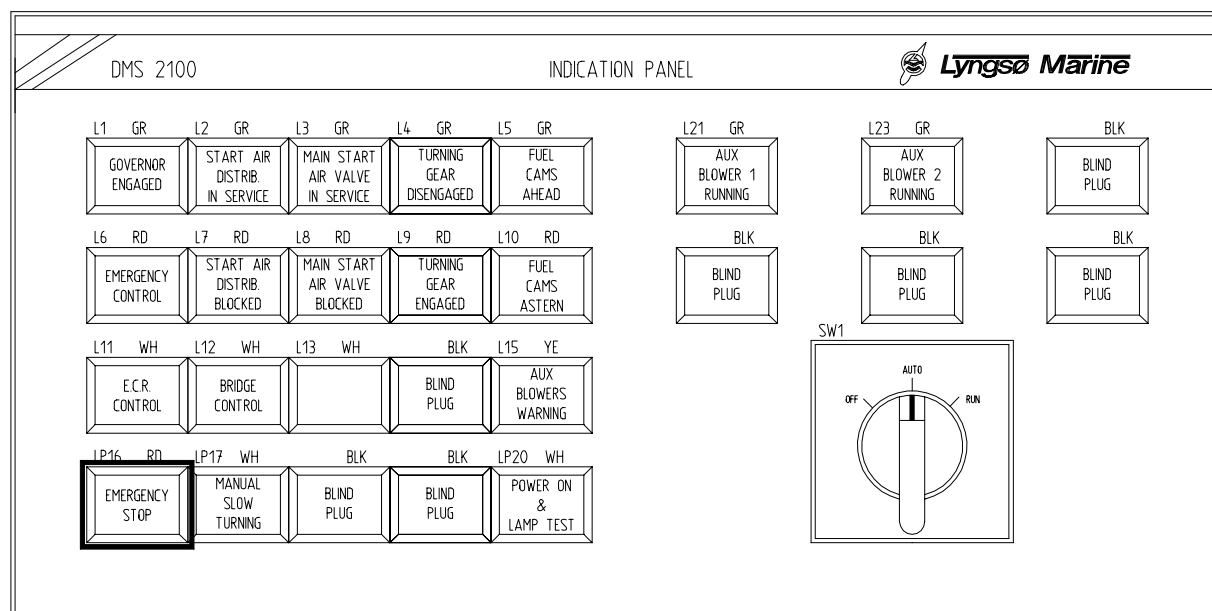


Figure 2.2: Front view of the ECR Sub Panel according to MAN B&W standard.

The following facilities – with designations according to fig. 2.2 - are available:

Explanations: Lx = Lamp no. x and LPx = Lamp & Pushbutton no. x

- L1 GOVERNOR ENGAGED, i.e. when the actuator connected to the fuel rack, then the green lamp is ON.
- L2 START AIR DISTRIB IN SERVICE, i.e. when the distributor is in service, then the green lamp is ON.
- L3 MAIN START AIR VALVE IN SERVICE, i.e. when in service, then the green lamp is ON.
- L4 TURNING GEAR DISENGAGED, i.e. when the turning gear is disengaged, then the green lamp is ON.
- L5 FUEL CAMS AHEAD, i.e. when the fuel cams are in ahead position, then the green lamp is ON.
- L6 EMERGENCY CONTROL, i.e. when Emergency Control (Local) from the engine room is present, then the red lamp is ON.
- L7 START AIR DISTRIB BLOCKED, i.e. when distributor blocked, then the red lamp is ON.
A start of the engine is not possible if this indicating light illuminates.

- L8 MAIN START AIR VALVE BLOCKED, i.e. when the main start air valve is blocked, then the red lamp is ON.
A start of the engine is not possible if this indicating light illuminates.
- L9 TURNING GEAR ENGAGED, i.e. when the turning gear is engaged, then the red lamp is ON.
A start of the engine is not possible if this indicating light illuminates.
- L10 FUEL CAMS ASTERN, i.e. when the fuel cams are in astern position, then the red lamp is ON.
- L11 ECR CONTROL, i.e. when manual control from the ECR is present, then the white lamp is ON.
- L12 BRIDGE CONTROL, i.e. when automatic control from the DMS2100i is present, then the white lamp is ON.
- L15 AUX BLOWERS WARNING, i.e. when the auxiliary blowers are disabled – control switch SW1 in OFF position – then the yellow lamp is ON.
- LP16 EMERGENCY STOP, i.e. when Emergency Stop is ordered from this pushbutton, then the red lamp indication is ON.
The pushbutton is protected with a plastic covering against unwanted operation.
- LP17 MANUAL SLOW TURNING:
By pressing this pushbutton a **Manual Slowturn is ordered, when in Manual ECR control mode of operation.** In all other modes of operation the pushbutton is disabled. The lamp has fixed white light as long as the pushbutton is activated.
- LP20 POWER ON & LAMP TEST, i.e. the white lamp is ON, when 24Volt power supply is available.
This pushbutton has a double function:
 - Signalling that the supply voltage is available.
 - Pressing this pushbutton a Lamp Test is carried out.
- L21 AUX BLOWER 1 RUNNING, i.e. when auxiliary blower number 1 is running, then the green lamp is ON.
- L23 AUX BLOWER 2 RUNNING, i.e. when auxiliary blower number 2 is running, then the green lamp is ON.
- Pos.13, 14, 18, 19, 22 and 24-26 are SPARE.
- SW1 Switch for control of auxiliary blowers, i.e. OFF/AUTO/RUN positions:
Control of the aux. blowers is external to DMS2100i.
OFF - Aux. blower stop command result in START BLOCKING and the warning L15 going ON.
AUTO - Aux. blowers are automatically switched ON/OFF based on measurement of scavenging air pressure.
RUN - Aux. Blowers are manually ordered to be permanently running.

2.3 The Local Control Box

The Local Control Box is installed at the Main Engine next to the Local Manoeuvring Stand. This box consists of several operating and indication facilities in order to handle the engine in Local Control Mode of operation, i.e. [**LOCAL CTRL.**] - see Fig. 2.3 below:

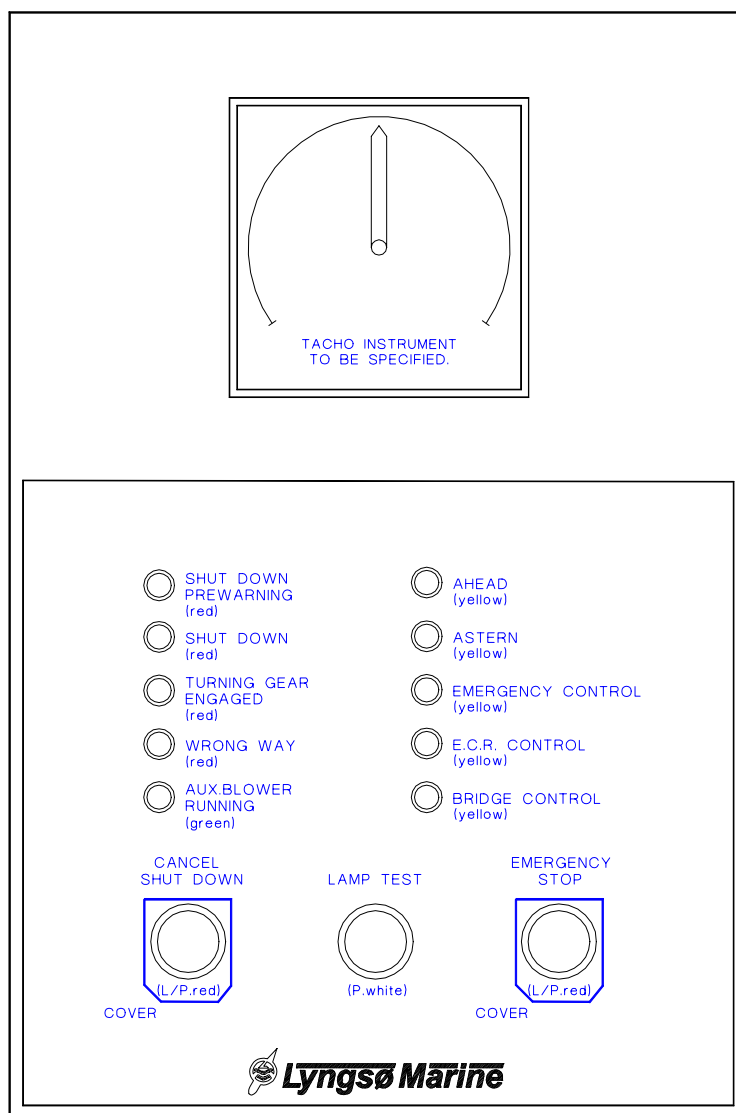


Figure 2.3: Front view of the Local Control Box

The following indications are installed in the first column:

- Indication light, SHUT DOWN PREWARNING
This red light indicates, that a Shutdown Prewarning signal is present

- Indication light, SHUTDOWN
This red light indicates that a Shutdown condition is present.
- Indication light TURNING GEAR ENGAGED
It illuminates in red colour, if the turning gear is engaged.
- Indication light WRONG WAY.
It illuminates in red colour, if the ordered direction is opposite to the actual RPM direction of the main engine.
- Indication light AUX BLOWER RUNNING
It illuminates in green colour, if the auxiliary blowers are running.

The following indications are installed in the second column:

- AHEAD, i.e. when the fuel cams are in ahead position, then the yellow lamp is ON.
- ASTERN, i.e. when the fuel cams are in astern position, then the yellow lamp is ON.
- EMERGENCY CONTROL, i.e. when Emergency Control (Local) from the engine room is present, then the yellow lamp is ON.
- ECR CONTROL, i.e. when manual control from the ECR is present, then the yellow lamp is ON.
- BRIDGE CONTROL, i.e. when automatic control from the DMS2100i is present, then the yellow lamp is ON.

The following pushbuttons/indications are present at the bottom of the Local Control Box:

- Illuminated pushbutton, CANCEL SHUTDOWN.
The pushbutton is protected with a plastic covering against unwanted operation. By pressing this pushbutton a CANCEL SHUTDOWN is released, and indicated in red light.
- Pushbutton LAMP TEST. When pressing this pushbutton a Lamp Test is carried out.
- Illuminated pushbutton, EMERGENCY STOP.
The pushbutton is protected with a plastic covering against unwanted operation. By pressing this pushbutton an EMERGENCY STOP is released and indicated in red light.

Further indications:

- BUZZER – placed at the bottom of the Local Control Box – is activated when WRONG WAY alarm is present.
- Tacho Instrument for the Main Engine RPM is placed at the top of the box. The scale is installation dependent.

2.4 Safety System for the Main Engine

The DMS2100i is normally delivered together with an independent DPS2100 (Diesel Protection System) Safety System for Main Engine Emergency Stop, Overspeed and Shutdown protection, which is interfaced to the DMS with hardware connections.

The system is based on a DZM 402 PLC with built-in functions for overspeed protection and speed indication to instruments, and inputs for two speed pickups. The system is then extended with one, two or three IOM 402 Input/Output Modules, with 16 DI (Digital Input) channels and 12 DO (Digital Output) channels each for Shutdown inputs and Shutdown solenoid valve outputs.

The Digital Input channels are all with cable supervision, i.e. the Shutdown sensor must be a normally Open Contact (OC) contact, connected with a 8k2 Ohm resistor across the contact, and a Closed Contact (CC) will then activate the Shutdown input.

The Digital Output channels are a solid state relay output, with jumper selection of cable supervision.

In the ECR, the DPS2100 Safety System has its own DPS Panel, where it is possible to see the relevant information for each Shutdown input channel, actual Main Engine RPM etc. on the display, and it is also possible to make adjustments and cut-outs on the Shutdown input channels.

Three keys with LED indication on the DPS Panel are used for Shutdown indication, Shutdown Cancel function and Shutdown Reset function. At the Bridge, the corresponding functions are shown on three keys on the DMS Panel.

The following functions are included in the DPS2100 Safety System:

- Shutdown stop output for the Main Engine (1 or 2 supervised valve outputs)
- Cancel VIT output active on stop and astern (1 supervised valve outputs)
- Overspeed stop of the Main Engine (2 pickup inputs)
- Shutdown inputs (20 supervised inputs)
- Emergency stop of the Main Engine (5 supervised inputs)
- Alarm outputs to the alarm system (8 outputs)
- Tacho output for ME RPM to instruments (9 +/-10V instruments)
- Cancel and Reset inputs from DMS System, ECR and Local (5 inputs)
- Local/Remote and DMS Control feedback (2 inputs)

For further information about the DPS2100 Safety System, please refer to the DPS2100 System Description and User Manual.

2.5 Main Engine Speed Measurement

The DMS2100i is using a Tacho Adapter Module (TAM401) to interface the Tacho Pickups.

The pickups are mounted close to the turning wheel on the main engine.

The TAM401 is connected to one of the CPU's on the Serial Interface Board used for measurement of the Main Engine speed.

2.6 Telegraph Transmitter and RPM Setpoint Control

The Bridge is equipped with a Telegraph Transmitter with built-in setpoint potentiometer on the Bridge Centre Console, as the Bridge main operation station. As an option the Telegraph Transmitter at the Bridge Centre can be interconnected by means of an Electric Shaft System to Bridge Wing Control at:

- Starboard Wing Panel
- Port Wing Panel

As standard the ECR is also equipped with a similar Telegraph Receiver. Optional the system can be delivered without equipment in the engine control room.

Bridge Centre and ECR Telegraph Levers are equipped with potentiometers with hardware connection to the DMS System.

The Bridge - and ECR Telegraph Levers are also used as engine telegraph system, when running in manual ECR control.

2.6.1 Electrical Shaft System

Ships with Bridge Wing Control, can as an option be equipped with an electrical shaft system interconnecting the Bridge Centre Telegraph with the Bridge Wing Control Telegraphs.

The electrical shaft system is an integrated part of the complete remote control system, but it is based on components completely independent of the DMS Gamma and all other items of the overall system.

The Electric Shaft System is a so-called synchronising system, in which non-activated control levers are following the active control lever, chosen as random, i.e. when the Bridge Centre is master, then the two Bridge Wing levers automatically follows the master lever in the Bridge Centre.

The system has been designed in such a way, that by means of a pushbutton switch, a chosen control unit is activated as master.

2.6.1.1 Bridge Centre and Wings Control Transfer

Each Telegraph Transmitter on the Bridge's Electrical Shaft System is equipped with three lamps and one pushbutton for control transfer:

- Pushbutton selection of which position is the master control unit
- Lamp indication with dimmer for which one of the three control positions are the master control unit

To change the control position between the three Control Units on the Bridge, press the [**Take Over / ON Service**] pushbutton on the new master control position, and it will change immediately, indicated with steady light in the [**Take Over / ON Service**] lamp/pushbutton.

As the levers are already synchronised by the electrical shaft system, there are no need for further alignments before pressing the [**Take Over / ON Service**] pushbutton.

2.6.2 Emergency Telegraph System

For backup communication of telegraph orders from the Bridge to ECR during ECR Control, and/or to the engine side in the Engine Room during local control, the system can optionally be extended with a separate Emergency Telegraph System, which is completely independent of the DMS2100i Bridge Control System and the normal communication Telegraph Levers.

By means of a rotating switch or a pushbutton for each telegraph order, and lamps for each telegraph order, the Communication Telegraph indicates the requested order.

On the Bridge, the switch is turned to the new order/the pushbutton for the new order is pressed. The lamp for the new order will start flashing, and the buzzer on the Bridge and in the ECR and/or a telegraph bell local on the engine side will start sounding.

To accept the new order, the switch on the receiver (ECR or local) must be turned to the position with the flashing lamp/the flashing lamp must be pressed, which will go into steady light and the buzzer will stop.

By means of a pushbutton on each of the receivers; it is possible to select between the ECR and the Local Communication Telegraph as the active receiver, i.e. the location from where it is possible to acknowledge the telegraph order from the Bridge.

3. DMS2100i Functional Description

3.1 Control Change-over

The Main Engine can be operated directly from the Bridge Panel, [**BRIDGE CTRL.**] and Telegraph Levers with optional Bridge Wing Control operating in parallel to the Bridge Centre or from the ECR Panel, [**E.C.R. CTRL.**] with Telegraph Receiver and Manual control lever. Please refer to section 2.6.1.1 for a description of the change over between Bridge Centre and the Bridge Wings.

When [**BRIDGE CTRL.**] is selected, the Main Engine's speed and direction is controlled by the position of the Bridge Telegraph Lever. The Gamma PLC located in the DMS2100i main cabinet convert the Bridge Telegraph Lever setpoint into a speed setting signal which is sent to the governor.

The control location can be transferred between ECR and Bridge Control, or between Bridge and ECR Control on request from either the Bridge Panel(s), or on request from the ECR panel without a previous request from the Bridge.

The control location making the request does not have to be the present control location.

The control location (Bridge or ECR Control) requesting the new control location (ECR or Bridge Control), must press the DMS Panel key:

- [**Bridge Ctrl.**] If change from ECR - to Bridge Control is requested
- [**E.C.R. Ctrl.**] If change from Bridge - to ECR Control is requested

As soon as the request for the control transfer is initiated from the Bridge or ECR, the buzzer in the Bridge Panels and the ECR Panel will sound, and the LED in the key for the new control location will start flashing, both on the Bridge Panel and in the corresponding LED on the ECR Panel. The buzzer sound for control transfer alert is making two beeps sounds followed by a 5 sec pause.

The LED for the present control location will remain in steady light, until all conditions for the new control location are fulfilled, then it will be switched off.

When the control transfer is acknowledged by pressing the flashing key on the acknowledge location DMS Panel:

- [**Bridge Ctrl.**] If ECR - to Bridge Control Transfer is acknowledged
- [**E.C.R. Ctrl.**] If Bridge - to ECR Control Transfer is acknowledged

The Changeover handle in the E.C.R. Console (pneumatically in older system or electrical in newer systems) is changed to the new control position.

The flashing LED's for the new control location will stop flashing and go into steady light, the LED's for the previous control location is switched off, and the buzzers will stop.

If the Bridge and ECR setpoint levers are not aligned, a changeover display will show up on the Bridge and ECR Panel with alignment barographs for the two setpoints, making it easier to align the setpoints.

Note: the changeover display will only show up if the DMS2100i Basic mode overview display is active. If the Basic mode overview display is not active press the [**ESC**] key several

times until the outermost display level is reached.

The LED's for the new control location will continue flashing until the change over request is either cancelled, or the Telegraph Levers have been aligned.

If the request for control transfer is not acknowledged on the acknowledge location, the request key at the request location can be pressed again to cancel the change over request. If the control location has not changed (Telegraph Levers not aligned), the flashing is stopped and the buzzer is silenced without further consequences.

Transfer of control are not taking place before Telegraph Levers are aligned, acknowledged is received from the acknowledge location and the Changeover handle in the E.C.R. Console is changed to the new control position.

Whether [**BRIDGE CTRL.**] or [**E.C.R. CTRL.**] is selected depends on the position of the Changeover handle placed in the E.C.R. Console.

Note: It is always the position of this handle which determines whether the Main Engine is controlled from the [**Bridge Ctrl.**] or from the [**E.C.R. Ctrl.**]. Consequently the engine staffs always have the possibility to change the control position independently of the DMS2100i and the navigators on the bridge.

When [**E.C.R. CTRL.**] is selected, the navigator will order the desired RPM through the Telegraph system. The engine staff will acknowledge the order from the Bridge Telegraph and control the Main Engine's speed and direction by acknowledging the order on the E.C.R. Telegraph Handle and manually execute the order on the Manual Control Lever.

Whether the [**BRIDGE CTRL.**] / [**E.C.R. CTRL.**] or the [**LOCAL CTRL.**] is selected depends on the position of the pneumatic change over Handle, placed on the Local/Emergency manoeuvring stand.

Note: It is always the position of this handle that determines whether the Main Engine is controlled from the DMS2100i Bridge Control System or from the Local/Emergency control stand in the engine room.

Consequently the engine staffs always have the possibility to change from remote control position to local Emergency Control independently of the DMS2100i System and the Bridge personnel.

3.1.1 Control Position Change-over by Request from the Bridge

If the navigator wants to change the control position, then he must press the key [**BRIDGE CTRL.**] (If change from E.C.R. control to Bridge control is desired) or [**E.C.R. CTRL.**] (If change from Bridge control to E.C.R. control is desired).

The LED in the new control position key will start flashing, both on the Bridge and in the corresponding LED in the E.C.R. Panel. The Changeover buzzer will sound (2 short beeps - pause - 2 short beeps etc.).

When the E.C.R. personnel acknowledges the change-over by pressing the flashing key on the E.C.R. Panel and moves the change-over handle to the new control position, the flashing LED will change to fixed light and the buzzer will stop.

If the Telegraph Levers are not aligned, [**E.C.R. Ctrl.**] LED's are flashing until Telegraph

Levers are aligned or the request is cancelled.

If the request is not acknowledged, the key can be pressed again to cancel the change-over request.

3.1.2 From Bridge Control to ECR Control

The indication LED's for Control Location at change over from Bridge Control to ECR Control are indicating in the following way:

- [**Bridge Ctrl.**] LED, i.e. the old control location is on the Bridge Panel and ECR Panel are in steady light until transfer has taken place. Activation of the key for the Bridge LED's will not change anything.
- [**E.C.R. Ctrl.**] LED, i.e. the new control location is on the Bridge Panel and ECR Panel are flashing with slow flash if the Telegraph Levers are aligned, until transfer has taken place or the request is cancelled.

3.1.3 Control Position Changeover by Request from E.C.R.

If the engine staffs want to change the control position without a previous request from the Bridge, then he must press the key [**BRIDGE CTRL.**] (If change from E.C.R. control to Bridge control is desired) or [**E.C.R. CTRL.**] (If change from Bridge control to E.C.R. control is desired) and moves the changeover handle to the new control position.

The LED in the new control position key will start flashing, both on the Bridge and in the corresponding LED in the Engine Control Room Panel. The Changeover buzzer will sound (2 short beeps - pause - 2 short beeps etc.)

When the navigator on the bridge acknowledges the change by pressing the flashing key on the Bridge Panel, the flashing LED will change to fixed light and the buzzer will stop.

If the Telegraph Levers are not aligned, [**Bridge Ctrl.**] LED's are flashing until Telegraph Levers are aligned or the request is cancelled.

If the request is not acknowledged, the key can be pressed again to cancel the change-over request.

3.1.4 From ECR Control to Bridge Control

The indication LED's for Control Location at change over from ECR Control to Bridge Control are indicating in the following way:

- [**E.C.R. Ctrl.**] LED, i.e. the old control location is on the Bridge Panel and ECR Panel are in steady light until transfer has taken place. Activation of the key for the ECR LED's will not change anything.
- [**Bridge Ctrl.**] LED, i.e. the new control location is on the Bridge Panel and ECR Panel are flashing with slow flash if the Telegraph Levers are aligned until transfer has taken place or the request is cancelled.

3.1.5 Forced Changeover from Bridge Control to ECR Control

A Forced Changeover from Bridge to ECR control is when the engineer turns the changeover handle in the E.C.R. Console from bridge to ECR control without a previous changeover request from the bridge.

The indication LED's for forced changeover from Bridge Control to ECR Control are indicating in the following way:

- [**Bridge Ctrl.**] LED, i.e. the old control location on the Bridge Panel and ECR Panel are in steady light until transfer has taken place. Activation of the key for the Bridge LED's will not change anything.
- [**E.C.R. Ctrl.**] LED, i.e. the new control location on the Bridge Panel and ECR Panel are flashing, and the buzzer is sounding until the bridge operator has acknowledged the forced changeover. This is just to tell the bridge operator that the control is no longer on the bridge, the bridge acknowledge has no actual influence on the changeover.

If Telegraph Levers are not aligned, ECR LED's are flashing until the ECR engineer making the forced changeover has aligned the Telegraph Levers.

3.1.6 Telegraph Levers Alignment

To be able to transfer the control location between Bridge and ECR, the Telegraph Levers for the two control locations must be aligned. For this purpose a setpoint display with barographs and digital readings of the setpoint lever positions is automatically displayed during the control changeover, if the levers are not aligned. Please refer to section 4.2.1 for a description of the setpoint system alignment display.

An adjustable dead-band around the exact commands for transfer without change of RPM, makes it easier to transfer control.

3.1.7 Cable Failure on Telegraph Levers

The setpoint potentiometers on all Telegraph Levers are individually supervised for cable failure, with an alarm for each potentiometer.

In case of cable failure on one of the setpoint potentiometers involved in a control transfer, the demands for alignment of the involved Telegraph Levers are cancelled.

It is not possible to transfer control to a Control Position, which has cable failure on the setpoint potentiometers.

3.1.8 Local Emergency Control

The LED for [**LOCAL CTRL.**] is switched on, when either the pneumatic change-over handle on the Emergency Control Stand is changed to Emergency Control or if the Governor is disconnected from the Fuel Rack, which is then connected to the regulating hand-wheel on the Emergency Control Console instead.

The LED indication on the [**Bridge Ctrl.**] or [**E.C.R. Ctrl.**] keys are switched off. From ECR control this changeover is done without any buzzer indication and confirmation from the

operator, but when changed from [**Bridge Ctrl.**] to [**Local Ctrl.**], the LED in the bridge panel [**Local Ctrl.**] key will start flashing and the buzzer will sound until acknowledged on the [**Local Ctrl.**] key to indicate for the navigator that [**Bridge Ctrl.**] control is no longer present.

This situation leaves the DMS2100i system unable to manoeuvre the Main Engine.

3.1.9 Local/Remote Control Transfer

To switch back to remote control, the

- Local Control on, feedback must be deactivated
- Governor engaged, i.e. remote control feedback must be activated

This will activate the buzzer in the ECR Panel and the [**E.C.R. Ctrl.**] key will start to flash on all DMS Panels.

To accept remote control, press the [**E.C.R. Ctrl.**] control key at the ECR Panel. Then the buzzer will stop, the [**E.C.R. Ctrl.**] key will switch to steady light, the [**Local Ctrl.**] key will switch off, and the optional output for the Remote Control On lamp indication is switched on, and it will be possible to operate the main engine from ECR or Bridge control again.

3.1.10 Local/Remote Control Transfer to Bridge

Control transfer from local to remote is normally acknowledged from the ECR Panel, but in the following situations it will be possible to change directly from Local to Bridge control:

1. If the DMS lose contact to the ECR panel, e.g. due to a power failure or cable failure to the panel. The DMS is always supervising the panels, and in case of a lost connection to the ECR panel, it generates an alarm used to enable the control transfer directly to the bridge.
2. In configurations without an ECR Panel, it is possible by means of the customising tool to specify that the local/remote control transfer is always going directly to the bridge.

3.2 Subtelegraph

The subtelegraph is used to give an order to the engine staff. The subtelegraph is a one-way communication system, i.e. the Bridge makes an order and the engine staff acknowledges it by pressing the panel key associated with the order. The following orders can be signalled:

- [**F.W.E.**]: Finished with engine, The Main Engine is stopped, and cannot be started.
- [**Standby**]: Main Engine is ready or running, but engine staff is needed on standby duty.
- [**Sea Mode**]: The Main Engine is running normally, and engine staff is no longer required for Main Engine operations.

There will always be one of these orders present in the System.

When the navigator wants to change to a new order he must press the desired panel key on the Bridge Panel. The LED in the panel key will start flashing, both on the Bridge and the corresponding LED in the Engine Control Room Panel. The change-over buzzer (2 short beeps - pause - 2 short beeps etc.) will also sound. The LED indicating the old order will remain as a fixed light.

When the engine room staff has pressed the flashing panel key the change-over buzzer will stop, but the LED will continue flashing until all the conditions for the order has been fulfilled. When the condition for the order has been fulfilled, the LED will switch to a fixed light, and the LED indicating the old order will be switched off.

If the order is not acknowledged, the flashing LED in the key can be pressed again to cancel the change of order.

The following changes are permitted (please refer to figure 3.2).

Note: Direct change from FWE to Sea Condition is disabled.

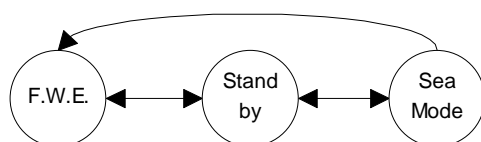


Figure 3.2: *Sub-telegraph change of status*

3.2.1 Conditions for Finished With Engine

The following conditions are necessary for FWE: ¹

- Control air pressure off
- Safety air pressure off
- Main start valve blocked.

3.2.2 Conditions for Standby

This command orders a manned ECR for the preparation of the engine for sea going or, if the engine is ready to start or running, where a manned ECR is required.

The following conditions are necessary for Standby: ¹

- Control air pressure on
- Safety air pressure on
- Main start valve not blocked
- Starting air distributor not blocked
- Turning gear not engaged.

3.2.3 Conditions for Sea Mode

This mode indicates, that there is no need for a manned engine room.

The following conditions are necessary for Sea-condition: ¹

- Control air on
- Safety air on
- Main start valve not blocked
- Starting air distributor not blocked
- Turning gear not engaged.

¹ The conditions for the subtelegraph can be customised from the Customising Tool, but the conditions mentioned in the previous description is the normal standard conditions for a MANB&W main engine.

3.3 Main Engine Start/Stop

3.3.1 Automatic Bridge Control

When [**BRIDGE CTRL.**] is selected and the system is not in [**F.W.E.**] mode; starting, stopping and control of the Main Engine speed is controlled by the position of the Bridge Telegraph Handle.

Moving the Telegraph Handle from Stop to Ahead or Astern will cause the starting sequence to be activated, i.e. starting air will be supplied until the Main Engine RPM has reached starting level. At this point Start Air is removed and fuel is supplied for approx. 8 seconds at a pre-set speedsetting level. If the RPM is increased in this period the start is considered successful and the RPM is set to the Telegraph setpoint value (except when limits are set by a Slow-down, load-program, or other limiting programs.)

If the Main Engine start attempt failed, a new repeated start will automatically be executed after 8 sec delay. After three failed start attempts a start-blocking occur, and the navigator has to move the Telegraph Handle to stop before a new start can be performed.

If the Main Engine is ordered to move in the opposite direction whilst moving, starting air will not be supplied until the Main Engine speed has decreased below reversing level. This may take several minutes, depending on the ships speed, propeller size, loading condition and other ship parameters.

The speed may be set to any speed between minimum and maximum, however the scale is normally divided into 9 speedsetting orders: "dead-slow", "slow", "half" and "full" in both directions in addition to "stop".

During commissioning, the rpm for each of these telegraph orders plus minimum and maximum in each direction are adjusted by the commissioning engineer in accordance with engine builder data, yard and owner requirements.

One or more of the limitations, which are mentioned in section 3.6.2 might limit the speed.

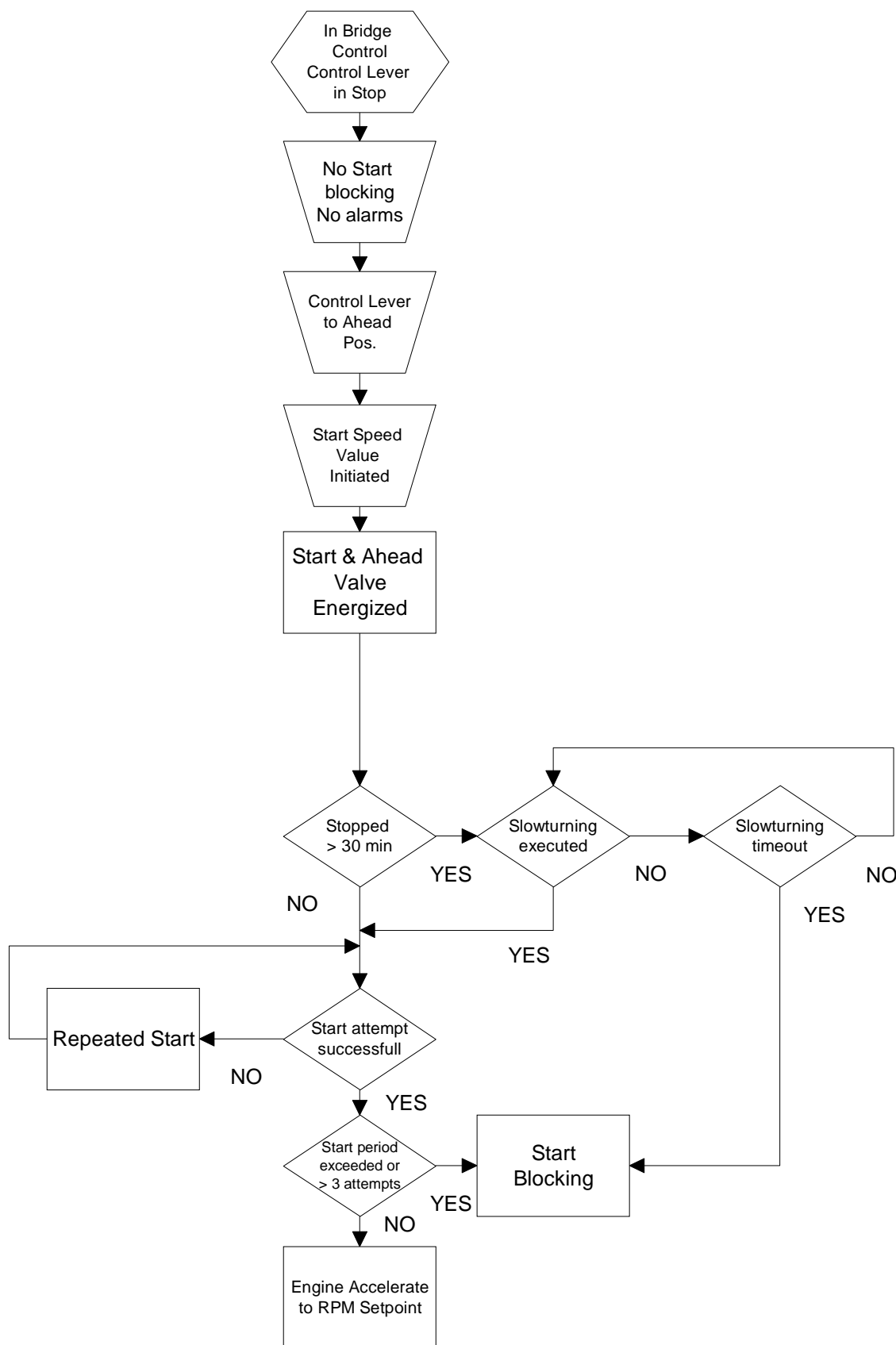


Figure 3.3.1: Main Engine Start sequence flow diagram

3.3.2 Manual ECR Control

When [**E.C.R. Ctrl.**] is selected the starting, stopping, reversing and speed-control of the Main Engine is handled from the E.C.R. Telegraph Handle placed in the Engine Control Room control console.

When the Bridge staffs wants to change the condition of the Main Engine, they order the Main Engine direction and speed by moving the Bridge Telegraph in the desired position. This will initiate the Telegraph alarm.

The engineer moving the ECR Telegraph Handle to the same order as that received from the Bridge Telegraph then accomplishes this from the Engine Control Room. This will at the same time acknowledge the Telegraph alarm.

All the operation from the Engine Control Room is completely similar to the operation from the Bridge, except that the operation is normally carried out on request from the Bridge Telegraph.

3.3.3 Start blockings

If the engine is not ready for start, i.e. Start Blocked, the [**Start Block**] LED on the Panel is on and a <Startblok> indication is displayed on line two of the Start/Stop control display, i.e. on the line above the softkeys. When the engine is ready for start, the indication change to either <Stopped> or <Slowt Req.> indicating if the next start will be with or without slowturning.

At the DMS Panel, it is possible to select a status list, displaying status for the different start-blockings for the Main Engine. Please refer to section 4.3.5 for a detailed description of how to display the Start Blockings List.

The following startblockings might be relevant for the DMS System:

- ME local control on
- ME Safety System Shutdown or Emergency Stop
- Startfailure (Start air time-out or Max number of failed start attempts)
- Slow turning failure (time-out)
- Main start valve blocked
- Start air distributor blocked
- Turning gear engaged
- Control air pressure low
- Safety air pressure low
- Start air pressure low
- Auxiliary blowers not in auto (optional)
- Engine running

Some start blockings are cancellable (selectable from customising tool) by means of the “**CANCEL ST.BLK**” Softkey. Please refer to section 4.3.2 for a description of how to use the Cancel Start blockings Softkey.

Cancel Start Blockings will normally activate an alarm in the DMS System also, to prevent the operators from using it when it is not necessary. To remove the cancellation of start

blockings again, activate the **“CANCEL OFF”** softkey beside the **“CANCEL ST.BLK”** softkey.

3.3.4 Reversing

During a normal Ahead (or Astern) start from standstill, the DMS will activate the main engine Ahead (or Astern) reversing valve together with the start valve, when the Bridge telegraph is moved to an Ahead (or Astern) start position, even if the main engine was also running in the same direction last time it was running.

The Ahead (or Astern) valve will activate the pneumatic cylinders used to reverse the camshaft roller guides and also reverse the start air distributor.

Pneumatic interlocks on the engine will ensure that starting air is not supplied to the engine before the start air distributor is reversed to the right position.

All camshaft roller guides will not be completely reversed before the engine start turning on starting air, so there are no interlocks from the camshaft roller guides to the DMS, i.e. the DMS will start the main engine independent of that one or more of the camshaft roller guides may not reverse completely to the new direction.

3.3.5 Slow turning

Slow turning of the Main Engine is normally used before the engine is started after a longer period of standstill, and is done by turning the engine for 1-2 revolutions on reduced starting air.

A MANB&W 2-stroke engine is automatically Slow turned, when it has been stopped for more than 30 min. by activating the Start Valve and Stop Valve as for a normal start, and at the same time activating the Slow turn Valve. When the engine has turned minimum 1.5 revolution, the Slow Turn Valve is released, and the start sequence continue as a normal start sequence.

If the slowturning is not completed within a few sec (adjustable), the engine is stopped again by deactivating the Start Valve and Slow turn Valve, and a **“Slowturning Time-out alarm”** is released giving a startblocking, which must be reset by the operator (setting the bridge telegraph in stop position) before a new start attempt can be executed.

The Slowturning can be cancelled from the Start/Stop menu by means of the **“SLOWTRN CANCEL”** Softkey. Please refer to section 4.3.2 for a description of how to use the Cancel Slowturning Softkey, or by pressing the [**LIMITS CANCEL**] key on the panel.

3.3.6 2-stroke Start/Stop

A MANB&W 2-stroke engine is started by releasing the Governor Stop, activating the Start - and Ahead direction valve (or Astern valve if reversing), while the Stop Valve is still activated. When the engine rpm passes the firing speed limit (8-12% adjustable), the Start - and Stop Valve is deactivated, and after the stabilising time (adjustable) the Ahead direction valve is deactivated (or Astern valve if reversing) and the engine is running.

3.3.7 Crash Stop

The preconditions for a crash stop detection is that the Telegraph Lever setpoint must have been above 75 RPM Ahead (adjustable) in more than 60 sec (adjustable) when the operator makes a reverse order to more than 20 RPM Astern (adjustable). The Telegraph Lever setpoint must be below 75 RPM Ahead again for more than 15 sec (adjustable) before the preconditions for detection of a crash stop is reset again.

The crash stop condition is then maintained until one of the following conditions are activated: the Astern setpoint order is put below 10 RPM Astern (adjustable) or the actual RPM comes within 5 RPM (adjustable) of the Astern setpoint limit of the 20 RPM or a maximum time-out of 300 sec (adjustable).

When the operator initiates a crash stop, the DMS will activate the Governor Stop and Stop valve to stop the engine, and if selected during the customising the Cancel Limits to the Governor is also activated.

After up to several minutes, the propeller speed will drop down below the reversing level of 20-25 RPM (adjustable), the Astern valve will be activated to reverse the Main Engine, and after 5 sec delay the Governor Stop is released and the Start valve will be activated to brake the Ahead turning of the engine and start it up in Astern direction.

When the engine speed rises above the firing speed of 8-12% RPM (adjustable) in Astern direction, the Start and Stop valve are released and the engine starts up on fuel.

After 8 sec stabilising time the Astern valve is deactivated, and 8 sec later again the Cancel Limits to the Governor is deactivated.

3.3.8 Repeated Start

If the start attempt is unsuccessful, a second start attempt is initiated and **<REP.START>** is indicated and a repeated start alarm is released.

When the engine rpm drops down below the firing speed (adjustable limit and hysteresis) the Stop Valve, Governor Stop and Governor Cancel Limits is activated, a **<Repeated start alarm>** is released, and after a 6-8 sec time delay (adjustable), a new start is initiated releasing the Governor Stop and activating the Start Valve again.

If the engine stops again after the maximum number of start attempts (configurable, normally three), the start sequence is terminated with an alarm for three start attempts, and a start blocking, which must be reset by putting the Telegraph lever in stop position, before any further start attempts can be made.

3.4 Main Engine Shutdown

The DMS2100i is normally delivered together with a DPS2100 Engine Safety System, which is mounted together with the DMS in the same cabinet. The DPS2100 safety system takes care of the engine Shutdown in case of a Shutdown -, Overspeed - or Emergency stop alarm, by activating the emergency stop valve directly. All the Shutdown inputs are connected directly to the DPS, and then send as group alarms to the DMS, for indication on the DMS panels.

The DPS2100 Panel is mounted in the ECR console, where all relevant information for each Shutdown input channel, actual Main Engine RPM etc. are displayed. Furthermore adjustments and cutouts on the Shutdown input channels are possible from the panel.

For a more detailed description of the DPS2100 Safety System, please refer to the DPS2100 User Manual.

The three keys on the DMS2100i Panels are used for the following functions:

- [**Shut down**] indicating Shutdown activated (steady light) and activates the Shutdown status list display
- [**Shutd. Cancel**] indicating Shutdown prewarning (flashing light) or activates and indicates if the Shutdown is cancelled (steady light)
- [**Shutd. Reset**] activates Reset of the Shutdown memory (not MANB&W engines)

In case of a Shutdown, the operator at the Bridge and ECR can get a Shutdown prewarning alarm, an adjustable time delay before the Safety System executes the Shutdown.

During the prewarning delay for the Shutdown, the LED in the [**Shutd. Cancel**] key on the DMS panel will flash. After the prewarning delay time-out, the LED in the [**Shut Down**] key on the DMS Panels will go to steady light and the Safety System will stop the Main Engine.

To silence the buzzer the [**Stop Horn**] key must be activated, and to acknowledge the [**Alarm Ackn.**] key. If more alarms are present, press [**Alarm Ackn.**] again until all alarms are acknowledged.

During the prewarning delay the operator has the possibility to cancel/override the Shutdown, by pressing the [**Shutd. Cancel**] key, which is then indicated by steady red light in the key.

If the ME is already stopped, before the [**Shutd. Cancel**] key is activated; the Shutdown must also be reset before it is possible to start the ME again.

To remove the cancel/override Shutdown function, the [**Shutd. Cancel**] key must be activated once more.

Further information about the reason for the Shutdown can be seen in the Shutdown List on the DMS Panels, which is selected by pressing the [**Shut Down**] key. Please refer to section 4.3.5.3 for a detailed description of the Shutdown List.

When the Shutdown memory has been activated, the reason for the Shutdown must be removed and the Shutdown reset, before a new start of the Main Engine is possible again.

When the reason for the Shutdown has been removed, the Shutdown must be reset from the present control location, which means that in Bridge Control the Bridge Telegraph must be placed in Stop position to reset, in ECR Control the Manual Control Lever must be placed in stop to reset, and in Local Emergency Control the Regulating Handle must be put in zero fuel index position to reset the Shutdown.

The Emergency Stop function is also a part of the Safety System, with independent push buttons on the Bridge and in the ECR, each wired in parallel to the Safety System.

Activation of one of the push buttons will cause an emergency stop of the Main Engine even if the panel is not in control.

When the Main Engine has been stopped by use of the emergency stop function, restart of the engine is blocked until the emergency stop pushbutton has been released again, and the Shutdown memory is reset from the present control location.

3.5 Main Engine Slowdown

In case of Slowdown, the Slowdown memory in the DMS is selecting the Slowdown RPM limitation in the Setpoint system, limiting the Main Engine RPM after a certain prewarning time delay (adjustable), e.g. when a Shaft Generator has been disconnected.

The Main Engine Slowdown system is an integrated part of the DMS System. The Slowdown inputs are normally connected directly to the DMS. Both binary and analog inputs are available. In both cases the Slowdown input(s) to the DMS are supervised inputs.

Alternatively the Slowdown inputs can be connected to the Alarm System, and outputs from the Slowdown group alarms in the alarm system are then connected to Slowdown inputs in the DMS System.

The Slowdown information are shown on three keys at the DMS Panel, both on the ECR and on the Bridge Panels. It is also possible to see the status information about each Slowdown on the Slowdown status display, and [**Display Channel**] information and use [**Adjust Channel**] for adjustments and cutouts on the Slowdown input channels. The Slowdown inputs are treated like an alarm input to the alarm system. For further information about alarm channels and adjustments, please refer to chapter 5, for DMS2100i Panel Alarm and Maintenance Functions.

The three keys on the DMS Panel are used for the following functions:

- [**Slow Down**] key indicates Slowdown activated (steady light), and activates the Slowdown status list display
- [**Slowd. Cancel**] key indicated Slowdown prewarning (flashing light) or activates and indicates if the Slowdown is cancelled,
- [**Slowd. Reset**] key activates Reset of the Slowdown memory.

In case of a Slowdown, the operator at the Bridge and/or ECR can get a Slowdown prewarning alarm, an adjustable time delay before the DMS System executes the Slowdown.

During the prewarning delay for the Slowdown the LED in the [**Slowd. Cancel**] key on the DMS panel will flash. After the prewarning delay time-out, the LED in the [**Slow Down**] key on the DMS Panel will go to steady light, and the DMS Setpoint System will reduce the Main Engine RPM setpoint to Slowdown level.

To silence the buzzer the [**Stop Horn**] key must be activated, and to acknowledge the alarm presses the [**Alarm Ackn.**] key. If more alarms are present, press [**Alarm Ackn.**] again until all alarms are acknowledged.

During the prewarning delay the operator has the possibility to cancel/override the Slowdown,

by pressing the [**Slowd. Cancel**] key, which is then indicated by steady red light in the key.

Further information about the reason for the Slowdown can be seen in the Slowdown status list on the DMS Panels, which is selected by pressing the [**Slow Down**] key. It will show a status line for each individual Slowdown input to the DMS system. Please refer to section 4.3.5.4 for a detailed description of the Slowdown List.

To remove the cancel/override Slowdown function, the [**Slowd. Cancel**] key must be activated once more.

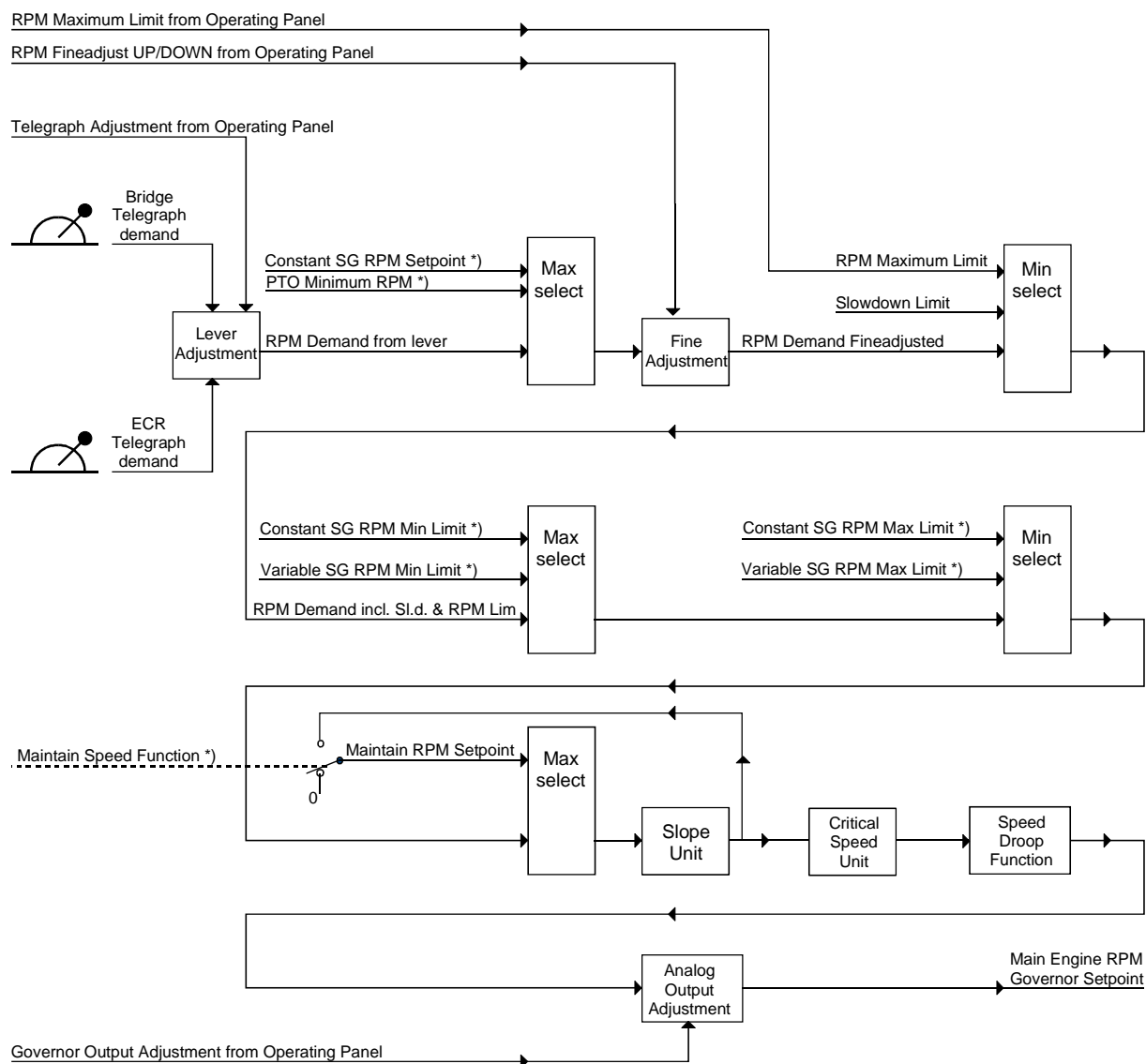
When a Slowdown has been activated, the reason for the Slowdown must be removed and reset, before the load of the Main Engine can be increased to the command level again, which are determined by the Setpoint Lever position.

When the reason for the Slowdown has been removed, which is indicated by flash in the [**Slowd. Reset**] key, the Slowdown memory is reset by pressing the [**Slowd. Reset**] key on the DMS Panel in control, or by moving the setpoint lever in command down below the limit for Slowdown and then increase again.

A Slowdown is also reset, if the engine is stopped by putting the Telegraph Lever in stop position or it can be customised according to the MANB&W specification to make an automatic reset when the Slowdown condition disappears again.

3.6 Setpoint System

The Setpoint system converts the potentiometer setpoints from the Telegraph Levers mounted on the bridge and in the ECR, to Main Engine RPM setpoint output for the Governor. This conversion is done in accordance with the speed request curves set-up in the DMS System. The Setpoint System is illustrated by figure 3.6 below:



*) Only in use, if shaftgenerator is in operation.

Figure 3.6: RPM Setpoint System lay-out.

3.6.1 Setpoint lever adjustments

The setpoint lever inputs are first going through an input scaling block, making the first rough scaling from 0 - 2 kOhm to the internal scaling 0 - 100.00 %. Normally the setpoint lever is not using the whole range on the potentiometer, requiring a re-scaling of the used part of the input range so that this is covering 0 - 100 % internal in the DMS.

To make it easier for the engineer to readjust the Setpoint Lever inputs, the DMS also includes the possibility to make a re-scaling from the DMS panel (password protected), where it will be possible to adjust the following setpoint inputs:

1. Telegraph Lever RPM setpoint Bridge
2. Telegraph Lever RPM setpoint ECR

Please refer to section 4.3.6.2 for a detailed description of the Setpoint Lever input adjustments.

3.6.2 Main Engine RPM Governor Setpoint

The Main Engine RPM is controlled either by an Electronic Governor or by a mechanical speed governor with a speed setting unit. The input to the Electronic Governor or the speed setting unit (e.g. an electrical-pneumatic I/P converter) for a mechanical governor is normally a 4-20 mA current signal corresponding to the requested RPM range.

Speed drop, which enables parallel operation of two or more engines on the same gear, or between the Shaft Generator and one or more diesel generators, might be included in the governor. It is supported by the DMS, with interconnection to frequency control inputs from the Power Management System.

The following strategies for the RPM speed setting are included in the Bridge Manoeuvring System.

3.6.2.1 Constant RPM Setpoint

Constant RPM for PTO operation is possible from both Bridge and ECR Control. The RPM setpoint for the Governor is a fixed value corresponding to e.g. 50/60 Hz for Shaft Generator operation.

The Constant RPM setpoint corrected for load variations on the Shaft Generator in case of a speed droop governor, is converted to a Governor setpoint signal without any limitations, except for Slowdown which might limit the RPM setpoint also (optional).

As long as a constant frequency Shaft Generator is connected to the Main Switch Boards, it will not be possible to select another mode than Constant.

3.6.2.2 PTO Minimum RPM

During e.g. SG operation, the speed demand can be limited to the minimum RPM, required from the connected SG or from other equipment connected to a Main Engine PTO output.

If the setpoint request from the setpoint lever is going down below the minimum RPM limit for one of the connected PTO's, the limit from the PTO with the highest minimum RPM will

be the resulting RPM setpoint. The limit for each PTO is predefined from the Customising Tools. When the operator increases the setpoint again, the function is removed.

Minimum RPM for a PTO connected SG will be handled by locking the setpoint in constant speed mode as long as a constant frequency SG is connected, or selecting the limited variable combinator mode for SG, as long as a variable frequency SG with frequency converter is connected. The variable frequency SG might also use the maintain speed function, to maintain the minimum RPM.

3.6.2.3 Panel Fine Adjustment of RPM

As an option, the operator can be able to fine-adjust the RPM setpoint from any one of the DMS operator panels, independent of the control position.

This adjustment is done by means of two “**Raise**” and “**Lower**” softkeys, located on the control display for the Setpoint system. The adjustment is limited to, e.g. +/-5 %, which is selected in the Customising Tool.

By means of a “**Reset**” softkey, it is possible to reset the adjustment back to zero. Moving the Telegraph handle will also reset the fine adjustment gradually back to zero.

3.6.2.4 PMS Fine Adjustment for Frequency Control

As an option, the RPM setpoint for a constant speed Shaft Generator can be fine-adjusted to compensate for the propeller - and Shaft Generator load, to be able to maintain 50/60 Hz on the Shaft Generator.

This adjustment is based on hardwired RPM Raise/Lower signals from the Power Management System, and is limited to the adjusted speed-droop range, e.g. +/-5 %, which is selected in the Customising Tool.

3.6.2.5 Slowdown RPM Setpoint

When the Main Engine Slowdown is active, the RPM setpoint is limited to the adjustable Slowdown limit after a certain timedelay (adjustable), or when a Shaft Generator has been disconnected from the MSB.

3.6.2.6 Shaft Generator Waiting Station Hold

The SG waiting station hold is activated by the DMS when the rpm setpoint is lowered by the operator, or in case of a RPM Slowdown, where the setpoint will be maintained on a predefined level until the shaft generator is disconnected.

After a predefined time-out the setpoint will be allowed to decrease down to the requested setpoint. In case of a MANB&W 2-stroke engine, this time-out, without the SG being disconnected, will result in a Shutdown of the engine.

3.6.2.7 RPM Setpoint Slope

Acceleration and deceleration slew rates are specified by a fixed setting adjustable by the Customising Tool, and specified in shaft RPM/sec. Another adjustment is selected when [**LIMITS CANCEL**] is activated, which is adjusted to give a faster response on the RPM setpoint.

3.6.2.8 Maintain Speed Function

The Maintain speed function is activated by means of an input from a variable speed shaft generator (e.g. connected with a frequency converter) running on a full range (50-100%) rpm, but not able to maintain the full load below e.g. 60 % rpm. When the setpoint drops below 60 %, the shaft generator activates the maintain speed function, and then the DMS selects the present setpoint as the minimum setpoint. When the operator increases the setpoint again, the function is removed.

3.6.2.9 Critical Speed Protection

The Critical Speed function protects the Main Engine RPM from running inside a pre-defined window (adjustable) for barred speed range, where the Main Engine are not allowed to run due to torsional vibrations on the Main Engine or in the Propeller Shaft.

Two independent Barred Speed Range windows can be defined in the DMS System.

3.6.2.10 Speed-Droop Compensation of Setpoint

As an option, the RPM setpoint for a Speed-droop Governor can be fine-adjusted to compensate for the propeller - and Shaft Generator load, to be able to maintain 50/60 Hz on the Shaft Generator.

This compensation is based on the RPM feedback signal, and is limited to the adjusted speed-droop range, e.g. 5 %, which is selected in the Customising Tool.

3.6.2.11 Governor Output Scaling

The RPM scaling internal in the DMS is $\text{RPM} \times 10$, and this RPM value is then rescaled in an output scaling block to a 0/4 - 20 mA or 0/2 - 10 Volt output for the Governor. This scaling can only be done by means of the Customising Tool, and requires a reload of the DMS program to the Gamma computer.

To make it easier for the engineer to readjust the RPM output for the Governor, the DMS also includes the possibility to make a re-scaling from the DMS panel (password protected), where it will be possible to adjust the RPM setpoint/mA relationship for the following five values:

1. Minimum RPM, e.g. 20 - 25 %
2. Dead Slow or Slow RPM, e.g. 25 - 40 %
3. Half Ahead RPM, e.g. 45 - 55 %
4. Full Ahead RPM, e.g. 75 - 85 %
5. Maximum RPM, e.g. 100 - 105 %

Please refer to section 4.3.6.1 for a detailed description of the Governor Output adjustments.

This governor output scaling adjustment is not relevant in case of EGS2000 Governor with serial interface to the DMS2100i.

4. DMS2000i Panel Operation Description

The DMS operation from the ECR and Bridge Panels is similar, and made by means of soft-keys, where the function is displayed on the 4-line display, and operated by means of four keys [S1] - [S2] - [S3] & [S4].

Up to five DMS Panels can be connected on a DMS System with:

- one panel in ECR
- one panel on the Bridge
- two panels on the Bridge wings (option)
- one panel on the aft bridge (option)

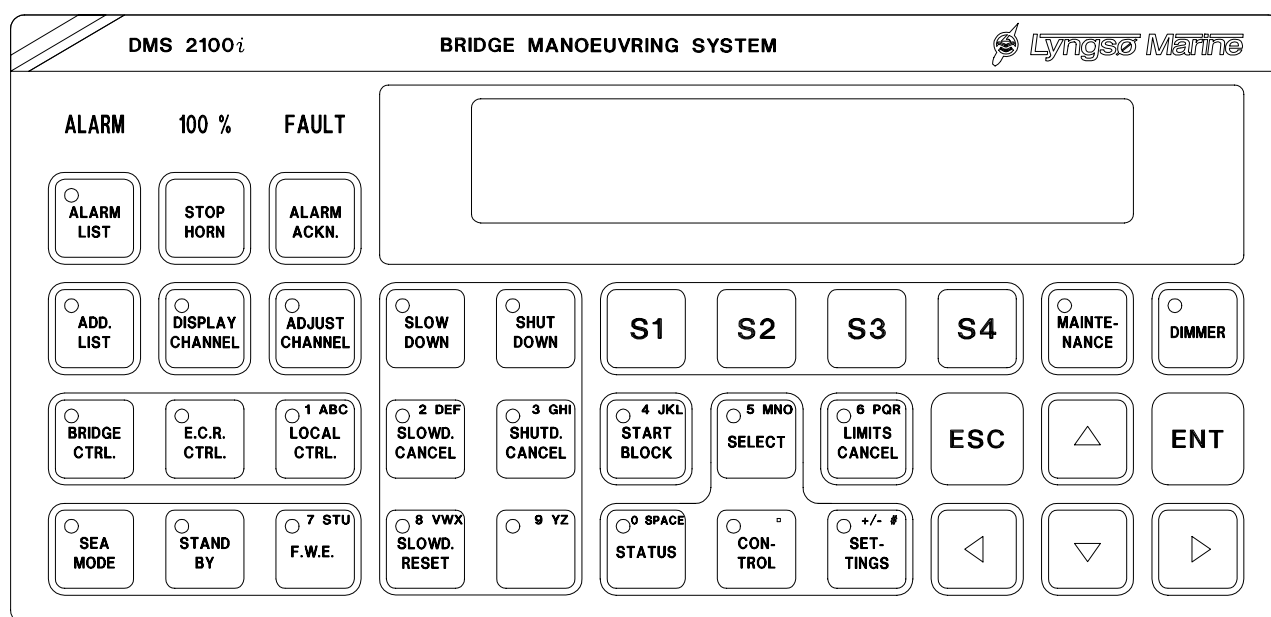


Figure 4: DMS2100i Operating Panel lay-out.

4.1 Control Right for DMS Control Functions

It is always possible to view the information on the different [Status], [Control] and [Settings] displays, independent of the present Control Location.

The Softkeys on the different DMS Control Functions are only working on the DMS Panels, which are in control, i.e. on anyone of the Bridge Panels in Bridge Control, and on the ECR Panel in ECR Control.

Activation of the Softkeys, for a DMS Control Function on a panel, which is not in control, will activate the buzzer for a short time, to tell the operator that the operation, which he is trying to execute, is not allowed at the moment.

The Bridge Centre, Port - and Starboard Wing Panels are working in parallel, i.e. when in Bridge Control, any operation can be done from any of the Bridge Panels without taking the present control position for the Electric Shaft on the Setpoint Lever in consideration.

4.2 Basic Mode Overview Display on DMS Panel

The Basic Mode overview display shows general status information for the DMS System. Basic Mode is the display selected, when the [**ESC**] key is pressed one or more times from an other display, until the outermost level is reached.

```
ME: <Runstat> 100.0 RPM, StAir 30.00 BAR
LIMITER:<Indic1>
TLG BC: ±120.0 ECR: ±120.0 EGS: 20.0 RPM
<Oldest unacknowledged alarm/Alarm stat>
```

Indications for Main Engine on the first line include:

- <Runstat> STOPPED Main Engine is Stopped
 SLOWT.REQ Main Engine is Stopped with slowturn request
 SLOWT.ON Main Engine is Slowturning
 SLOWT.OK Main Engine Slowturning finished
 SLOWT.ERR Main Engine Slowturn has failed
 STARTING Main Engine is Starting
 START ERR Main Engine Start is failing
 RUNNING Main Engine is Running
 STOPPING Main Engine is Stopping
- <Indic1> NO LIMIT RPM Setpoint unlimited
 MAX RPM RPM Max Limit active
 GOVERNOR RPM/Fuel Index Limited by EGS2000
 LOAD PROG Loadprogram actively limiting RPM Setpoint
 SLOW DOWN Slowdown actively limiting RPM Setpoint
 CRIT. SPD Critical Speed limiting RPM Setpoint
- <ME RPM> ±120.0 RPM Main Engine RPM
- <StAir> 0 - 40.00 BAR Main Engine Start air pressure

Setpoint indication on the third line include: Bridge RPM setpoint ±100.0 %, ECR RPM Setpoint ±100.0 % and . EGS2000 manual lever setpoint 0-100.0 %

- Bridge Tlg ±100.0 Bridge Telegraph setpoint
- ECR Tlg ±100.0 ECR Telegraph setpoint
- Man. Sp. 0-100.0 EGS2000 manual lever setpoint

Indications on the fourth line will show the alarm status with the number of present alarms when no unacknowledged alarms are present, the information of any alarm channels in manual suppression, or the oldest unacknowledged alarm if any of these are present.

4.2.1 Setpoint System Alignment

When the operators are changing the control position between ECR and Bridge, this Barograph display for aligning the Telegraph Levers is automatically displayed.

ALIGN BRIDGE AND ECR SETPOINTS		
BRIDGE TELEG:	-----Xmmmmmmmmmm	±100%
ECR TELEGRAF:	-----Xmmmmmmmmmm-	± 92%
MANUAL ECR	:-----Xmmm-----	22%

As preconditions for the control position change-over, the Basic Mode overview display must be active, if not press the [ESC] key until the outermost display level is reached.

4.2.2 Other DMS Panel Indications

Indications on other DMS Control Functions might use the following standard definitions:

- <MODE> Local Function Block is in local control mode
Remote Function Block is in manual control mode
Auto Function Block is in auto control mode
- <Feedback> No Feedb. Function Block has no feedback activated
Disengage Function Block is Disengaging/Closing/Stopping
Engage Function Block is Engaging/Opening/Starting
D.engaged Function Block is Disengaged/Closed/Stopped
Engaged Function Block is Engaged/Open/Running
2 feedb. Function Block has two feedback signals
- <Interlk> Interlock Function Block is Interlocked by external input
Blocked Function Block is Blocked due to failure
- <Status> Off/Normal/etc., i.e. Feedback not activated
On/Active/Shutdown/Slow Down/St.Block, i.e. feedback activated

4.3 Operation from DMS Panel

4.3.1 Select of Machine Control Groups

To operate a DMS Control Functions by means of the Softkeys on the DMS Panel, the operator must first activate the [Select] key on the DMS Panel, after which the machine control groups including DMS control functions are displayed.

SELECT CONTROL GROUP:	
x1	DMS START/ STOP SYSTEM
x2	DMS CONTROL FUNCTIONS
x4	DMS SG INTERFACE
x5	DMS STATUS LIST
x6	DMS I/O ADJUSTMENTS

The requested Machine Group is selected by means of the [**Arrow**] and the [**Enter**] keys, and the DMS Control Functions in that particular Machine Group are shown.
If a Machine Group includes only one DMS Control Function, such as the Main Engine Start/Stop control, it is shown directly when the machine group is selected.

4.3.2 Main Engine Start/Stop Operation

Selecting the “**DMS START/STOP**” will go directly to the Softkeys for Main Engine Start/stop [**CONTROL**] display, because the Start/Stop Group only contains one Machinery Control Function.

The display will show the ID and Text for the function block on the first line, and information regarding the DMS Control Function, which can be operated by means of the Softkeys on the second line.

To execute one of the commands, activate the corresponding softkey. Only one function can be operated at the time.

ME1ST ME START/STOP							
<Mode		<Runstat>				<ME RPM>	
S	CANCEL	S	CANCEL	S	SLOWTRN	S	RESET
1	OFF	2	STR.BLK	3	CANCEL	4	

When Machine Control Group 21 for ME1 Start/Stop are selected, the Main Engine Start-blockings can be “**CANCEL**”ed, Startblocking cancel can be removed again by the “**CANCEL OFF**” and an automatic “**SLOWTRN CANCEL**”ed can be requested by means of the [**S1**] .. [**S4**] softkeys plus “**RESET**” of valve supervision alarms.

Indications for Main Engine on the second line include:

- <Mode> LOCAL Main Engine in Local Control
ECR Main Engine in E.C.R. Control
BRIDGE Main Engine in Bridge Control
- <Runstat> STOPPED Main Engine is Stopped
SLWT. REQ Main Engine is Stopped with slowturn request
SLWT. ON Main Engine is Slowturning
SLWT. OK Main Engine Slowturning finished
SLWT.FAIL Main Engine Slowturn has failed
STARTING Main Engine is Starting
STR.BLOCK Main Engine is Startblocked
STR.FAIL Main Engine Start is failing
RUNNING Main Engine is Running
STOPPING Main Engine is Stopping
- <ME RPM> ±120.0 RPM Main Engine RPM

4.3.2.1 Main Engine Start/Stop Status List

Pressing the [**STATUS**] key when a DMS Control Function is selected, will show the available status indications for that particular DMS Control Function, and if it includes more than the four indications which can be shown on line two together with the softkeys, they can be found here.

The display for Main Engine Start/Stop Control etc. includes the following information:

ME1ST	ME START/STOP
ME CONTROL LOCATION	<Mode >
MAIN ENGINE STATUS	<Runstat>
ME RPM	±120.0 RPM
ME START AIR PRESS	0-40.00 bar

Indications for Main Engine <Mode> and <Runstat> see previous section.

4.3.2.2 Main Engine Start/Stop Adjustments

Pressing the [**SETTINGS**] key when the DMS Start/Stop Control Function is selected, will show the adjustable parameters related to Start/Stop.

The settings display for Main Engine Start/Stop Control includes the following parameters:

ME1ST	ME START/STOP
START LEVEL AH	10.0 rpm
START LEVEL AS	-10.0 rpm
REVERSING LEVEL	22.0 rpm

To make the adjustment, select the actual parameter from the list by means of the [**Arrow**] and [**Enter**] keys.

Then key in the appropriate password when asked for it and the display will show the old value on line 3, and the new value can be typed in on line 4, which is also showing the minimum and maximum values for the adjustment.

The actual Main Engine RPM feedback is shown on line 2.

ME1ST	ME START/STOP
ME RPM	± 100.0 rpm
>START LEVEL AH	10.0 rpm
New Value: 10.0_	[0.0; MAX AH]

To change the adjustment, type in the new value, and accept with the [**Enter**] key.

Start Level Ahead & Reversing Level are limited to the range from zero to Maximum Ahead.

Start Level Astern is limited to the range from Maximum Astern to zero.

4.3.3 Select Main Engine Control Functions

The actual DMS Control Function in the “DMS CONTROL FUNCTIONS” group is selected by means of the [**Arrow**] and [**ENT**] keys, and the selected DMS Control display with Softkeys or Status list will show up.

SELECT CONTROL OBJECT:	
ME1SPF	RPM FINE ADJUST
ME1SPX	MAX RPM LIMIT
ME1TIF	ME TACHO SYSTEM

4.3.3.1 Main Engine Setpoint Fineadjust

Selecting the “RPM FINE ADJUST” will go to the Main Engine Setpoint fine adjustment [**CONTROL**] display, with the possibility to fine adjust the rpm setpoint, e.g. to be able to adjust the SG frequency to 50/60 Hz.

ME1SPF		RPM FINE ADJUST	
<FadjStat>		±95.6	±96.7 rpm
S	FINEADJ	S	FINEADJ S RESET
1	LOWER	2	RAISE 3

Indications on the second line include:

- | | | |
|------------|-----------|--|
| <FadjStat> | RAISE RPM | Fine adjust Raising rpm is activated |
| | LOWER RPM | Fine adjust Lowering rpm is activated |
| | FADJ MAX | Fine adjust Maximum rpm limit is reached |
| | FADJ MIN | Fine adjust Minimum rpm limit is reached |
| | MAX RPM | Maximum RPM setpoint limit is reached |
| | MIN RPM | Minimum RPM setpoint limit is reached |
- <±95.6 rpm> ±0-120.0 rpm Selected rpm setpoint from telegraph
- <±96.7 rpm> ±0-120.0 rpm Adjusted rpm setpoint including fine adjust add-on

Each keypress on the “**Fineadj Raise**” softkey will e.g. increase the RPM setpoint with 0.1 RPM for a slow speed 2-stroke engine (configurable from customising tool), and vice versa for the “**Fineadj Lower**” softkey.

On the left side of the display is shown the setpoint from the Telegraph Levers or constant speed setpoint, and on the right side is shown the setpoint including the added fine adjustment value.

A third key “**Reset**” makes it possible for the operator to reset the fine adjustment value, which is added to the setpoint back to zero.

The fine adjustment of the setpoint is limited to e.g. +/- 5 RPM (configurable from customising tool) for a 2-stroke slow speed engine.

This fine adjustment is working in parallel to the optional fine adjustment inputs from the power management system, used when a constant speed shaft generator is connected to the MSB.

4.3.3.2 Main Engine Setpoint Fineadjust Status

Pressing the [**STATUS**] key, when the “**RPM FINE ADJUST**” is selected will go to the Main Engine Setpoint fine adjustment Status display.

ME1SPF	RPM FINE ADJUST	
SELECTED SETPOINT		95.6 rpm
ADJUSTED SETPOINT		96.7 rpm
FINE ADJUST STATE		<FadjStat>

4.3.3.3 Max RPM Limit Adjustment

Selecting the “**MAX RPM LIMIT**” will go to the Main Engine Max RPM Limit adjustment [**SETTINGS**] display, where the ship’s crew is able to limit the maximum RPM for the Main Engine during Password Level 1.

A new list showing the present adjustment will show up.

ME1SPX	MAX RPM LIMIT	
Max RPM Limit		0-150.0 RPM

To make the adjustment, select the ECR MAX RPM Limit from the list by means of the [**Arrow**] and [**Enter**] keys.

Then key in the appropriate password when asked for it and the display will show the old value on line 3, and the new value can be typed in on line 4, which is also showing the minimum and maximum values for the adjustment.

The actual Main Engine RPM feedback is shown on line 2.

ME1SPX	MAX RPM LIMIT	
ME RPM FEEDBACK		± 100.0 RPM
>MAX RPM LIMIT		0-150.0 RPM
New Value:	91.7_	[ECR HalfAH; MAX AH]

To change the adjustment, type in the new value, and accept with the [**Enter**] key. The Max RPM Limit adjustment is limited to the range ECR Half Ahead to Maximum Ahead.

4.3.3.4 Max RPM Limit Adjustment Status

Pressing the [**STATUS**] key, when the “**MAX RPM LIMIT**” is selected will go to the Main Engine Max RPM Limit adjustment status display, where the ship’s actual RPM for the Main Engine is shown.

ME1SPX	MAX RPM LIMIT	
ME RPM FEEDBACK		± 100.0 RPM

4.3.3.5 ME Tacho Selector

Selecting the “**ME TACHO SYSTEM**” will go to the Main Engine Tacho Selector [**CONTROL**] display, with the possibility to manually “**Select Tacho 1**” from the DMS Tacho System or “**Select Tacho 2**” from the EGS2000 Tacho system. Default should during normal operation be “**Autoselect Tacho**” where it for safety reasons will automatically select the tacho with the highest RPM.

ME1TIF ME TACHO SYSTEM							
<TacMode>		<TachSel>		<TacFail>		±120.0	
S	SELECT	S	SELECT	S	AUTOSEL	S	RESET
1	TACHO 1	2	TACHO 2	3	TACHO	4	

Indications on the second line include:

- | | | |
|-----------|----------|--|
| <TacMode> | AUTO | Auto-select highest tacho RPM |
| | SELECT 1 | Tacho 1 Manually selected, makes alarm for Tacho 2 |
| | SELECT 2 | Tacho 2 Manually selected, makes alarm for Tacho 1 |
- | | | |
|-----------|---------|--------------------------------------|
| <TachSel> | TACHO 1 | Tacho 1 selected, (manually or auto) |
| | TACHO 2 | Tacho 2 selected, (manually or auto) |
- | | | |
|-----------|-----------|--|
| <TacFail> | T1 FAIL | Tacho 1 in failure |
| | T2 FAIL | Tacho 2 in failure |
| | T1 TOO HI | Tacho 1 signal larger than 110% of overspeed rpm |
| | T2 TOO HI | Tacho 2 signal larger than 110% of overspeed rpm |
| | T1+2 FAIL | Tacho 1 and 2 both in failure condition |
- | | | |
|----------|--------------|--------------------|
| <±120.0> | ±0-120.0 rpm | Selected tacho RPM |
|----------|--------------|--------------------|

4.3.3.6 ME Tacho System Status List

Pressing the [**STATUS**] key when the ME Tacho System is selected will go to the Main Engine Tacho System status list showing some more detailed information about the ME Tacho system, than are available on the Control Display.

ME1TIF ME TACHO SYSTEM	
ME SELECTED TACHO	±120.0 rpm
ME SELEC.TACHO STATE	OK/FAIL
TACHO SELECTION MODE	<TacMode>
SELECTED TACHO	<TachSel>
TACHO 1	±120.0 rpm
TACHO 1 STATE	OK/FAIL
TACHO 2	±120.0 rpm
TACHO 2 STATE	OK/FAIL
TACHO FAIL STATE	<TacFail>

4.3.4 Shaft Generator Interface

Selecting the “**ME SG INTERFACE**” will go to the Main Engine SG Interface status list, showing the status for the signals going between the DMS and an external power consumer, using a primary PTO, e.g. the Shaft Generator.

ME1SGI ME SG INTERFACE	
SG PTO STATUS	NOT READY/READY
CONSTANT SG REQUEST	OFF/ON
CONSTANT SG FEEDBACK	OFF/ON
VARIABLE SG REQUEST	OFF/ON
VARIABLE SG FEEDBACK	OFF/ON
DG STANDBY START	OFF/ON
MAINTAIN SPEED REQ.	OFF/ON

It is showing if the PTO is ready for SG operation, if the SG is requested and online in constant or limited variable mode, if a standby diesel generator is requested to start or if a SG with frequency converter is asking the DMS to maintain the present speed.

4.3.5 DMS Panel Status Lists

Beside the Status indications displayed on the DMS Control Functions, the Machinery Group X5 for Main Engine Status Lists includes some additional DMS Control Functions including indication lists corresponding to the alarm groups for Shutdowns, Slowdowns and Start-blockings in the DMS, and other for general indications of Analog and Digital Inputs in the DMS, which are not shown in other lists.

If an alarm or event is active in one of the first two groups, the LED in the corresponding key on the DMS Panel will light up.

Selecting the **“DMS STATUS LISTS”** will go to a new softkey structure with the DMS Control Functions included in this group:

SELECT CONTROL OBJECT	
ME1GIF	ME GOVERNOR
ME1_SB	ME START BLOCKINGS
ME1_SHD	ME SHUTDOWN
ME1_SLD	ME SLOWDOWN
ME1SP	ME SETPOINT SYS
ME1STG	ME SUB TELEGRAPH

4.3.5.1 Main Engine Governor Interface

Selecting the **“ME GOVERNOR”** will go to the Main Engine Governor Interface List showing the status for the governor interface signals, and the values for the analog DMS settings to the Governor, because it contains no control functions

ME1GIF ME GOVERNOR	
ME RPM FEEDBACK	±120.0 rpm
GOVERNOR SETPOINT	0-120.0 rpm
SP.DROP COMPENSATION	0-5 % rpm
GOVERNOR STOP ON	OFF/ON
CANCEL LIMITS ON	OFF/ON

The Governor setpoint displayed, is the adjusted setpoint without the RPM regulation compensating for the Speed Droop loss.

The physical output for the “Governor setpoint” are the sum of: Governor setpoint + Speed Droop Compensation.

The *line for Speed Droop Compensation* is optional.

4.3.5.2 Main Engine Startblockings List

Selecting the “**ME START BLOCKINGS** ” will go to the Main Engine Startblocking List showing the Startblocking conditions, because it contains no control functions. The Main Engine Startblocking list can also be selected directly, just by pressing the [**Start Block**] hard-key on the DMS Panel. The status display for Main Engine Startblockings include information whether the Main Engine is ready for start on the first line, or startblocked on the second line and whether the startblocking is cancelled. The following lines show what has caused a Startblocking of the Main Engine.

ME1SB ME START BLOCKINGS	
READY TO START	ON/OFF
START BLOCKED	OFF/ON
STARTBLOCK CANCELLED	OFF/ON
LOCAL CONTROL	OFF/ON
SHUT DOWN	OFF/ON
START/FAIL	OFF/ON
SLOWTURNING FAIL	OFF/ON
MAIN START VALVE BLK	OFF/ON
START AIR DISTR. BLK	OFF/ON
TURNING GEAR ENGAGED	OFF/ON
CONTROL AIR PRES LOW	OFF/ON
SAFETY AIR PRESS LOW	OFF/ON
START AIR PRESS LOW	OFF/ON
AUX BLOWERS NOT AUTO*1	OFF/ON

*1 *Aux. Blowers not auto startblocking is optional, not MANB&W standard.*

4.3.5.3 Main Engine Shutdown List

Selecting the “**ME SHUTDOWN**” will go to the Main Engine Shutdown List showing the Shutdown conditions, because it contains no control functions. The Main Engine Shutdown list can also be selected directly, just by pressing the [**SHUT DOWN**] hard-key on the DMS Panel. The status display for Main Engine Shutdown includes information whether the Pre-warning is active, and what has caused an Emergency Shutdown of the Main Engine:

ME1SHD ME SHUTDOWN		
DPS: SHD PREWARNING		OFF/ON
DPS: SHD ACTIVE		OFF/ON
DPS: SHD CANCELLED		OFF/ON
DPS: EMERGENCY STOP		OFF/ON
DPS: OVERSPEED		OFF/ON
DMS TACHO OVERSPEED		OFF/ON

4.3.5.4 Main Engine Slowdown List

Selecting the “**ME SLOWDOWN**” will go to the Main Engine Slowdown List showing the Slowdown conditions, because it contains no control functions. The Main Engine Slowdown list can also be selected directly, just by pressing the [**SLOW DOWN**] hard-key on the DMS Panel. The status display for Main Engine Slowdown includes information about what has made a Slowdown of the Main Engine.

ME1_SLD ME SLOWDOWN		
SLOWDOWN PREWARNING		OFF/ON
SLOWDOWN ACTIVE		OFF/ON
SLOWDOWN CANCELLED		OFF/ON
L.O. PRESS INLET		OFF/ON
L.O. TEMP INLET		OFF/ON
CAMSH. L.O. PRESS IN		OFF/ON
PIST C.O. PRES INLET		OFF/ON
PIST C.O. FLOW OUTLT		OFF/ON
PIST C.O. TEMP OUTLT		OFF/ON
FC.WATER PRESS INLET		OFF/ON
FC.WATER TEMP OUTLET		OFF/ON
SCAVENGING AIR FIRE		OFF/ON
THRUST BEARING TEMP		OFF/ON
CYL.LUBRICATORS FLOW		OFF/ON
EXHAUST GAS TEMP		OFF/ON
CRANKCASE OILMIST		OFF/ON
MAIN BEARING TEMP		OFF/ON
AXIAL VIBRATION MON.		OFF/ON

Note: The number of Slowdowns required, depends on the Classification society.

4.3.5.5 ME Setpoint System Status List

Selecting the “ME SETPOINT SYS” will go to the Main Engine Setpoint System showing the Status List for the Main Engine Setpoint System with Setpoint system status, and the values for the analog settings in the setpoint system of the DMS.

ME1SP	ME SETPOINT SYS
RPM SETPOINT STATUS	<SetpStat>
BRG RPM SETPOINT	± 100 %
ECR RPM SETPOINT	± 100 %
SELECTED SETPOINT	0-120 RPM
ADJUSTED SETPOINT	0-120 RPM
MAX RPM LIMIT	60-120 RPM
RPM SLOWDOWN LIMIT	45 RPM
BRG EL.SH POSITION	<ElShStat>
ME MAINTAIN SPEED	OFF/ON
ME FIXED SPEED REQ.	OFF/ON
ME SG CONNECTED	OFF/ON

The *Bridge El-shaft control position* is optional.

The *SG interface signals* are optional.

Indications for the Setpoint System include:

- <SetpStat> NO LIMIT RPM Setpoint unlimited
RPM LIMIT RPM Setpoint is limited for some reason
- <ElShStat> CENTER Bridge Center in control
SB WING Bridge Starboard Wing in control
PORT WING Bridge Port Wing in control
AFT Bridge Aft in control

4.3.5.6 DMS2100i Sub-Telegraph Status List

Selecting the “**ME SUB TELEGRAPH**” will go to the Main Engine SUB-Telegraph status list showing information regarding the Sub-telegraph request from the bridge, actual Mode and external sensor feedback signals on the following lines.

ME1STG	ME SUB TELEGRAPH	
SUBTELEGRAPH REQUEST		<Request>
SUBTELEGR. FEEDBACK		<Modestat>
MAIN START VALVE BLK		ON/OFF
START AIR DISTR. BLK		ON/OFF
TURNING GEAR ENGAGED		ON/OFF
CONTRL AIR PRESS LOW		ON/OFF
SAFETY AIR PRESS LOW		ON/OFF

Indications for Main Engine on the second line include:

- <Request> FWE REQ Finished With Engine request from bridge
STBY REQ Standby request from bridge
SEA REQ Seacondition request from bridge
- <Modestat> FWE MODE Finished With Engine Mode active
STBY MODE Standby Mode active
SEA MODE Seacondition Mode active

4.3.5.7 Load Controller Status List

When the “EGS LOAD CONTROL” is selected, the Status list will display the status for each of the limitations in the EGS2000 Limiters/Overload Protection System, including feed-back for the corresponding signals used to calculate the limitations:

LOAD CONTROL	
STATUS	NO LIMIT
DMS RPM REQUEST	± 100.0 RPM
EGS RPM SETPOINT OUT	± 100.0 RPM
MAX ENGINE LOAD	0-110.0 %
ACTUAL ENGINE LOAD	0-110.0 %
ACTUAL FUEL INDEX	0-100.0 %
SEL. LOAD PROGRAM	NORMAL
LOAD PROGRAM STATUS	MIN
LOAD PROGRAM OUTPUT	60-100.0 %
RPM LIMITER STATE	LIMIT OFF/ON
RPM LIMITER OUTPUT	0-100.0 %
ME RPM	0-800 RPM
CHARGE AIR LIM STATE	LIMIT OFF/ON
CHARGE AIR LIM OUTP	0-100.0 %
CHARGE AIR PRESSURE	0-3.00 bar
SLOW DOWN STATE	OFF/ON
SLOW DOWN LIMIT	40.0 %

Note: The EGS Load Control status list is optional, and requires that the DMS2100i and EGS2000 are connected by means of a Serial Interface.

4.3.6 Input/Output Adjustments

Selecting the “**DMS I/O ADJUSTMENTS**” key on the control group display, will go to a new softkey structure with the Machinery Control Functions, with inputs or outputs, which can be adjusted:

SELECT CONTROL OBJECT:			
ME1GIFO	GOVERNOR	OUTPUT	ADJ
ME1SPAB	BRG	RPM	LEVER ADJ
ME1SPAE	ECR	RPM	LEVER ADJ
ME1SPAM	EMG	RPM	SETPT ADJ

Installation dependent optional *EMG RPM SETPT ADJ*.

4.3.6.1 Adjustment of Governor Output

Selecting the “**GOVERNOR OUTPUT ADJ**”ust for adjustment from the “**DMS INPUT/OUTPUT ADJUST**” on the group display, it will be possible to adjust the mA output for e.g. the following speeds listed in the display (corresponding e.g. to min, Slow, Half, Full and Max on a 2-stroke engine) and then of course, it must be checked if the main engine speed changes to the corresponding RPM setpoint, or if the output needs further fine-adjustments. The adjustment is password protected at Level 2.

ME1GIFO GOVERNOR OUTPUT ADJ			
RPM	OUTPUT	TABLE X1	20.0 RPM
RPM	OUTPUT	TABLE Y1	20.0 RPM
RPM	OUTPUT	TABLE X2	40.0 RPM
RPM	OUTPUT	TABLE Y2	40.0 RPM
RPM	OUTPUT	TABLE X3	55.0 RPM
RPM	OUTPUT	TABLE Y3	55.0 RPM
RPM	OUTPUT	TABLE X4	77.0 RPM
RPM	OUTPUT	TABLE Y4	77.0 RPM
RPM	OUTPUT	TABLE X5	100.0 RPM
RPM	OUTPUT	TABLE Y5	100.0 RPM

To make the adjustment, select e.g. the Manoeuvre Full Speed Output for 75% RPM (i.e. Output table Y4) from the list by means of the [**Arrow**] and [**Enter**] keys.

Then key in the appropriate password when asked for it and the display will show the old value on line 3, and the new value can be typed in on line 4, which is also showing the minimum and maximum values for the adjustment.

The actual RPM setpoint is shown on line 2, which for the Constant Speed adjustment requires that Constant Speed is selected, and the internal RPM adjustment for Constant speed is correct (CT adjustment only).

The Governor Output request from the DMS, is the setpoint, which is transformed to a mA signal for the Main Engine Governor.

Note: this adjustment is not relevant in case of EGS2000 with serial interface to DMS2100i.

ME1GIFO GOVERNOR OUTPUT ADJ			
ACTUAL RPM SETPOINT	77.0	RPM	
RPM OUTPUT TABLE Y4	77.0	RPM	
New Value:	78.9	[0.0; 3200.0]	

To change the adjustment, type in the new value by means of the arrow keys, and accept with the [**Enter**] key.

4.3.6.2 Adjustment of RPM Telegraph Levers

Selecting the **"BRG, ECR OR EMG RPM LEVER ADJ"** for adjustment from the **"DMS INPUT/OUTPUT ADJUST"** on the group display, which will contain an entry key for the input from all the Telegraph Levers, it will be possible to offset adjust the setpoint in the three positions: Stop-zero/100% Astern and 100% Ahead RPM, just by pressing the right key, when the setpoint lever is in the corresponding position. The adjustment is password protected.

ME1SPA ECR RPM LEVER ADJ					
± 0-80 %				± 0-100 %	
S	ADJUST	S	ADJUST	S	ADJUST
1	ZERO	2	100% AS	3	100% AH

On the left side of line two, the unscaled input from the input scaling block is displayed, e.g. for a 0 - 1000 Ohm potentiometer scaled 0 - 100%, only the mechanical range 100 - 900 Ohm corresponding to ± 80% is used, and this is then rescaled to ± 100% for internal use in the system. All three lever adjustments are similar.

4.3.6.3 RPM Setpoint Adjustment Status List

On the setpoint adjustments status list, the unscaled setpoint input and the scaled setpoint is displayed.

ME1SPAB BRG RPM LEVER ADJ	
BRG RPM SETPT INPUT	± 80.0 %
SCALED BRG RPM SETPT	± 100.0 %

ME1SPA ECR RPM LEVER ADJ	
ECR RPM SETPT INPUT	± 80.0 %
SCALED ECR RPM SETPT	± 100.0 %

5. DMS2100i Panel Alarm and Maintenance Functions

The Operating Panel can operate in a basic overview mode or in one of the 7 main modes. This section describes these modes in further detail, that is:

- Basic overview mode.
- Control Functions mode, please refer to chapter four, for description of Control functions
- Alarm list mode.
- Additional list mode.
- Display channel mode.
- Adjust channel mode.
- Maintenance mode.
- Dimmer Mode.

5.1 Basic Mode

The Basic Mode overview display shows the status for the DMS2100i, the actual rpm and starting air pressure values as well as the present settings from the telegraph handles on the bridge and in the engine control room and the Manual RPM Speedsetting in ECR.

Indications on the fourth line will show the alarm status with the number of present alarms when no unacknowledged alarms are present, the information of any alarm channels in manual suppression, or the oldest unacknowledged alarm if any of these are present.

ME: SLOWT.REQ	0.0 RPM, StAir	25.0 BAR
LIMITER:	NO LIMIT	
TLG BC:	25.0 ECR:	25.0 EGS: 30.0 RPM
S*MODULE DMS1M101 (REM401) ERROR ALM		
11 Alarms		CH(s) SUPP.
<Oldest unacknowledged alarm >		

The basic mode is meant as a "standby mode". By pressing [ESC] a finite number of times (normally once, in some menus twice), the basic mode is obtained.

In the basic mode, the panel displays in the fourth line:

- The "*" indication if unacknowledged alarms are present in the DMS2100i.
- The "S" indication if the alarm is simulated in the DMS2100i.
- The number of alarms and unacknowledged normals in the DMS2100i.
- If manual suppressed channels are present in the DMS2100i (i.e. simulated or manual cut-out).

5.2 Hard - and Softkey Overview

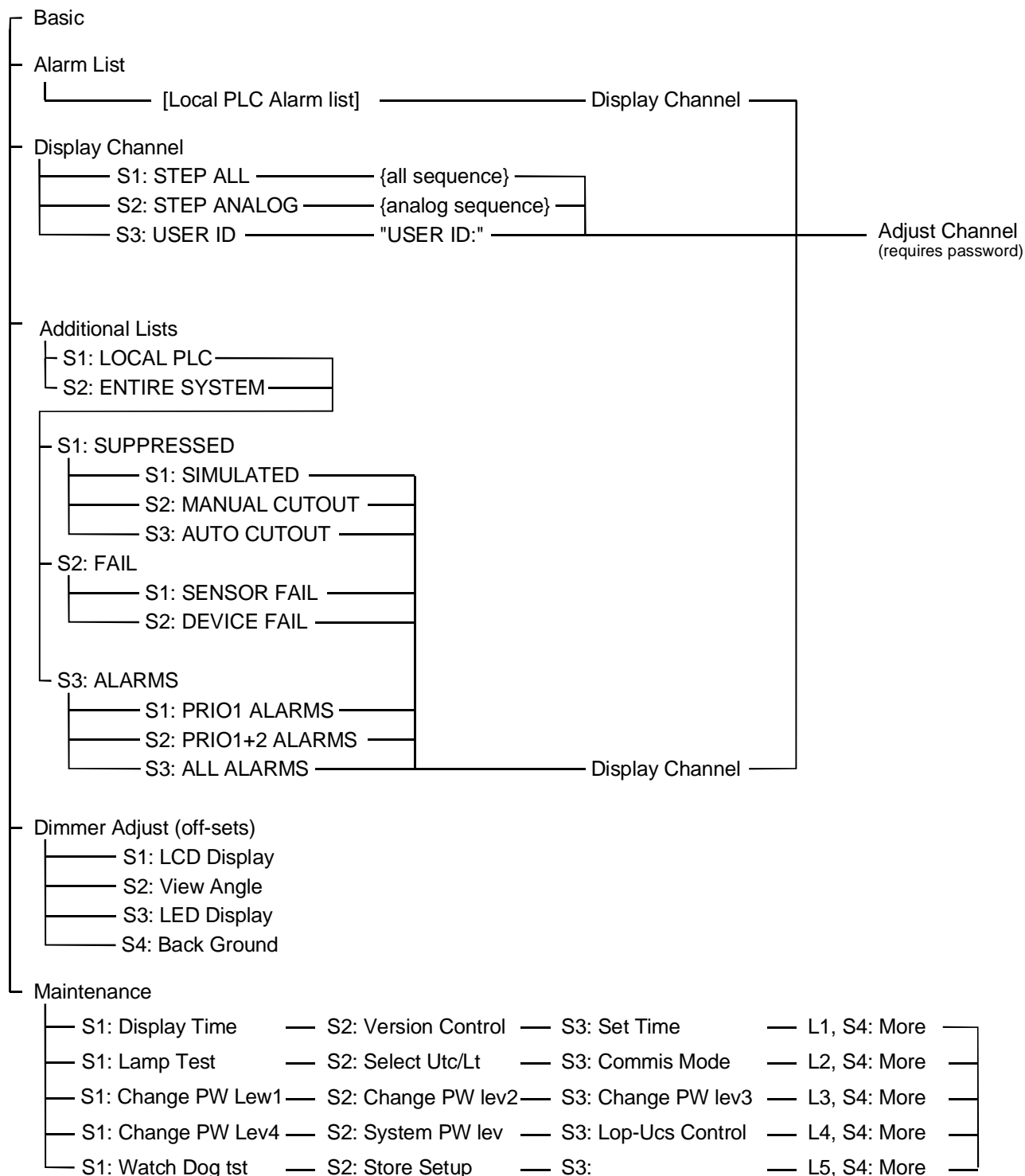


Figure 5.1: This overview show the entry hardkeys to the different main modes, and how the Soft keys S1..S4 are used to select the different functions when one of the main modes is active.

5.3 Alarm List Mode

The Operating Panel enters the Local PLC alarm list mode for DMS2100i, when [**ALARM LIST**] is pressed. Other lists in the system are accessed by pressing [**ADD. LIST**].

The ALARM LIST LED is illuminated, when the panel operates in the alarm list mode.

The alarm list includes all standing and unacknowledged alarms. The alarms are placed chronologically in the alarm list.

When [**ALARM LIST**] is pressed, the DMS2100i LCD displays:

```
<no> Alarms Alarm LIST <alarm system> ▲▼
S*<channel name          > <stat >
S*<channel name          > <stat >
S*<channel name          > <stat >
```

Activating the [<] key brings forward mode 2:

```
<no> Alarms Alarm LIST <alarm system> ▲▼
S*<id>      <value>          < mes txt >
S*<id>      <value>          < mes txt >
S*<id>      <value>          < mes txt >
```

Activating the [<] key brings forward mode 3.

NOTE: Mode 3 displayed below is not shown in a stand alone DMS2100i system:

```
<no> Alarms Alarm LIST <alarm system> ▲▼
S*<id>      < text          >          < stat >
S*<id>      < text          >          < stat >
S*<id>      < text          >          < stat >
```

Line 1 of the LCD is used to display the total number of alarms and the name of the selected list "Alarm LIST". The next line(s) is used for display of standing- and unacknowledged alarm(s). The newest alarm is at the bottom of the display, i.e. entry of the alarm list is always from the <END OF LIST>:

- | | | | |
|---|----------------|------------|--|
| ● | <no> | XX | Number of standing and unacknowledged alarms |
| ● | <alarm system> | LOCAL PLC | DMS2100i System PLC |
| ● | S | | Simulated channel |
| ● | * | | Unacknowledged alarm |
| ● | <channel name> | Alarm text | Text describing the actual alarm |
| ● | <stat> | ALM | Alarm condition is present |
| | | FAIL | Sensor failure |
| | | NORM/CA | Cut-out of alarm is active |

		(Manual or automatic cut-out)
	NORM	Alarm condition has normalised
	!! Gone	Alarm acknowledged and normal
	?	Device failure
• <id>	Alarm ID	The channels user identification
• <mes txt>	-	Explaining text with examples below:
	NORMAL	The alarm is non-standing
	SENS FAIL	Sensor failure
	ALARM	Alarm is present
	COMM. OK	Communication is OK
• <text>	Located in PLC: X	Alarm originates in PLC number X
• <value>	Optional	Physical value of analog channel

If a channel, which is displayed, is acknowledged and returns to normal, it is not removed from the display. It will first disappear when the operator steps in the list, or enters the list again.

By means of the [▲] / [▼] keys, the operator can select the previous / next 3 alarm in the alarm list. This means that [▲] will display older alarms, and [▼] will show newer alarms.

When the operator reaches the start/end of the list, this is indicated by:

<START OF LIST > and
<END OF LIST> respectively.

If no alarms are present in the list, the No. of alarms is 0 and the line(s) used to display the alarm(s) is blanked.

Example: When [**ALARM LIST**] is pressed, the DMS2100i LCD displays:

13 Alarms	Alarm LIST LOCAL PLC	▲▼
*GAMMA 1:	COMM. TO PCS PANEL 1	NORM
ME	CONTROL POSITION FAIL	!! Gone
*ME	TACHO 2 ERROR	ALM

"TACHO 2 ERROR" is the newest of the alarms, "GAMMA 1: COMM. TO PCS PANEL 1" is non-standing and "CONTROL POSITION FAIL" is non-standing and acknowledged.

Further information like User Id and signal whereabouts may be obtained by activating the [>] and [<] keys. A total of three modes are available.

13 Alarms	Alarm LIST LOCAL PLC	▲▼
*G1_LOP1		COMM. OK
ME1_POS		!! Gone
*ME1_RPM2		ALM
13 Alarms	Alarm LIST LOCAL PLC	▲▼
*G1_LOP1	Located in PLC : 1	NORM
ME1_POS	Located in PLC : 1	!! Gone
*ME1_RPM2	Located in PLC : 1	ALM

5.4 Additional List Mode.

An DMS2100i Operating Panel enters the additional list mode when [**ADD. LIST**] is pressed. The add. list LED is illuminated as long as the panel operates in this mode. During operation the following lists are supported:

- List of simulated monitoring channels.
- List of monitoring channels in manual cut-out
- List of monitoring channels in automatic cut-out
- List of monitoring channels in sensor fail.
- List of monitoring channels in device fail.
- List of monitoring channels in alarm or fail, priority 1
- List of monitoring channels in alarm or fail, priority 1 + 2
- List of monitoring channels in alarm or fail, total.

When [**ADD. LIST**] is pressed, the operator must first select LOCAL or GLOBAL LIST - if the DMS2100i is fully integrated with the UMS2100 alarm system - and thereupon the actual list type is chosen.

Entry at the Alarm lists is at the <End of list>, i.e. the newest alarm, while Entry at other lists are at the <Start of list>, i.e. the lowest channel number.

5.4.1 Selecting the List Type.

When [**ADD. LIST**] is pressed, the DMS2100i LCD displays:

SELECT LOCAL OR GLOBAL LIST:					
S	LOCAL	S	ENTIRE		
1	PLC	2	SYSTEM		

NOTE: This LCD display is omitted, if the DMS2100i is not fully integrated with the UMS2100 alarm system.

Please refer to the overview in figure 5.2 for the complete softkey hierarchy.

When the system is chosen the selection of list types are presented:

SELECT LIST TYPE					
<no>		<no>		<no>	
S	SUP-	S	FAIL	S	ALARMS
1	PRESSED	2		3	

Above each softkey indication, the number of entries <no> are displayed for the Local PLC.

The following LCD displays are an example of how to get to the wanted list – in this case the Manual Cut-out-list:

When the suppressed list type [**S1**] is chosen the actual sub-list is pointed out:

SELECT SUPPRESSED LIST TYPE					
<no>		<no>		<no>	
S	SIMU-	S	MANUAL	S	AUTO-
1	LATED	2	CUTOUT	3	CUTOUT

Finally the chosen Manual Cut-out-list [**S2**] can be viewed:

3 Manual Cut-outs			LOCAL PLC	▲▼
MODULE	DMS1C002 (SIO)	ERROR	NORM/CA	
ME	CONTROL POSITION	FAIL	NORM/CA	
ME	TACHO 1	ERROR	NORM/CA	

5.4.2 At the List Level

When alarm system and list type has been specified, the Operating Panel displays the list entries using the following layout:

<no>	<list type>	<alarm system>	▲▼
S*<channel name		>	<stat >
S*<channel name		>	<stat >
S*<channel name		>	<stat >

The first line contains the list count, the list type and the alarm system:

- <no> XX Number of items in chosen list
- <list type>
 - Simulated Channels Simulated channels list
 - Manual Cut-outs Manual cut-out list
 - Automatic Cut-outs Automatic cut-out list
 - Sensor Fails Sensor fails list
 - Device Fails Device fails list
 - Alarm Prio 1 Alarms priority 1 list
 - Alarms Prio 1+2 Alarms priority 1 and 2 list
 - Alarms Prio 1+2+3 Total alarm list
- <alarm system>
 - LOCAL PLC DMS2100i System PLC
 - DMS ALM SYS UMS2100 Alarm System
- S Simulated channel
- * Unacknowledged alarm
- <channel name> Item text Text describing the actual item
- <stat>
 - ALM Alarm condition is present
 - FAIL Sensor failure
 - NORM/CA Cutout of alarm is active
(Manual or automatic cut-out)
 - NORM Alarm condition has normalised
 - !! Gone Alarm acknowledged and normal
 - ? Device failure

5.5 Display Channel Mode

The Operating Panel enters the display channel mode, when [**DISPLAY CHANNEL**] is pressed. As long as this mode is on, the display channel LED is illuminated. In this mode it is possible to display and change the channel specification for all monitoring channels in the DMS2100i.

Selection of the channel to display can be done in the following ways:

- By entering the monitoring channel ID (user ID)
- By browsing in a list of all monitoring channels.
- By browsing in a list of all analog monitoring channels
- If the display displays monitoring channels when [**DISP CHANNEL**] is pressed, the operator can select between the displayed channels (e.g. in alarm list mode, the operator can select between the displayed alarms).

Please refer to the overview in figure 5.2 for the complete softkey hierarchy including where to activate Display Channel.

When a channel is entered pressing [>] or [<] causes the <next>/<previous> channel to be displayed. By next/previous is meant:

- If the channel is selected by entering user ID, the next/previous channel - sorted after user ID - is selected.
- If the channel is selected by browsing between all channels, the next previous channel - sorted after user ID - is selected.
- If the channel is selected by browsing between analog channels, the next previous analog channel - sorted after user ID - is selected
- If the channel is selected from a list, the next/previous channel - sorted after user ID - is selected.

5.5.1 The Text Entry Screen

If [**DISPLAY CHANNEL**] is pressed while the Operating Panel does not display any alarm, the following layout is displayed:

USER ID: <ID>					
S	STEP	S	STEP	S	USER
1	ALL	2	ANALOG	3	ID

The user ID is initialised to the last displayed ID. First time after a restart of the DMS2100i, ID is initialised to the lowest ID.

By pressing [**ESC**] the panel returns to basic mode. By pressing [**ENT**] the current channel number is selected and the panel enters the "channel status screen".

By pressing the softkeys [**S1**]/[**S2**] it is possible to browse through channels of the

DMS2100i. The [S1] key allows stepping through all existing channels while [S2] allows stepping through all existing analog channels. Once the [S1]/[S2] keys are pressed, the panel enters the "stepping/status screen".

5.5.2 The Stepping/status Screen

When the [S1]/[S2] softkeys are pressed in the "text entry screen", the panel allows selecting of channel addresses by browsing. This is illustrated below:

```
<ID> <channel name      >
PRESS [LEFT] FOR PREV., [RIGHT] FOR NEXT
```

By use of the two cursor keys [<] and [>] it is possible to select the previous/next channel on the DMS2100i. By each key-press, the panel displays the new channel ID and channel name. The stepping procedure is meant as a fast way of selecting related channels while the "text entry screen" provides the initial channel address.

The type of stepping (i.e. all channels, or all analog channels) is determined by which softkey that caused the "stepping/status screen" to pop up.

By pressing [ESC] the panel returns to the "text entry screen", by pressing [ENT] the panel enters the "channel status screen" displaying information about the presently selected monitoring channel.

5.5.3 Channel Status Screen.

The "channel status screen" is used for displaying information about a valid selected monitoring channel:

```
ME START AIR PRESSURE LOW      ?
ME1CFG01      -5.05 bar        DEV. FAIL
UTC TIME      :      00-08-22 08:13:26
L1: LOW PRES  LOW LIMIT      10.00 PRIO 1
```

At this level of the display channel mode there are additional lines of information.

By the use of [▲] and [▼] the operator can select new lines of status information.

Hence, the vertical cursor keys [▲] and [▼] select new lines of information while the horizontal cursor keys [<] and [>] select new channels. By pressing [ESC] the "text entry screen" is displayed, that is, [ESC] must be pressed twice to reach the basic mode.

5.5.4 The Entry Selection Screen.

When the panel operates in basic mode, for instance, the LCD displays information about the eldest unacknowledged alarm. When there is at least one unacknowledged alarm in the alarm list, when [**DISPLAY CHANNEL**] is pressed, the panel switches directly to the "channel status screen" showing information about the actual monitoring alarm.

If [**DISPLAY CHANNEL**] is pressed while the operating panel displays more than one alarm, the LCD displays the "entry selection screen" prompting the operator to choose between the displayed alarm entries.

SELECT CHANNEL TO DISPLAY			
S*<channel name	>	<stat	>
*<channel name	>	<stat	>
*<channel name	>	<stat	>

The information of each line depends on whether alarm list mode 1, 2 or 3 was selected prior to pressing [**DISPLAY CHANNEL**]. Mode 3 is not available in a stand alone DMS2100i system.

The dynamic values are not updated in the "entry selection screen" mode.

The cursor is placed at the first alarm. The cursor can be moved by use of [**▲**] and [**▼**]. The operator can select between the displayed alarms only, that is, it is e.g. not possible to scroll an entire alarm list after the [**DISPLAY CHANNEL**] has been selected.

If [**ENT**] is pressed, the channel which is pointed out by the cursor is selected, and, the panel enters the "channel status screen". By pressing [**ESC**] the panel returns to basic mode.

The following modes support the "entry selection screen" (active prior to pressing [**DISPLAY CHANNEL**]):

- Basic mode.
- List mode.
- Suppressed list mode (cutouts or simulated channels).

5.6 Adjust Channel Mode.

Adjust is a sub mode to the display channel mode. Adjustments can be carried out from any one of the DMS2100i Operating Panels. [**ADJUST CHANNEL**] is only active when the panel displays the "channel status screen" of the display channel mode, i.e. when a channel parameter which can be adjusted is displayed.

If [**ADJUST CHANNEL**] is a valid keystroke, and the panel is not in a privileged access level, the panel prompts the operator for a level 1 password. The adjust channel and display channel LEDs start to flash when the password is entered successfully. The display channel LED continues to flash as long as the panel is operating at the "channel status screen" and the timeout of app. 2 minutes has not expired. After timeout or leaving intentionally the "channel status screen" the password for [**ADJUST CHANNEL**] must be re-entered unless still in privileged access level.

With the legal password entered, or if the system is already in an access-privileged mode, the panel prompts the operator for a new value, when a parameter is selected by pressing [**ENT**]. When the adjustments of new values have been finished [**ESC**] is pressed and the panel returns to the "channel status screen" of display channel mode, i.e. the panel has left the adjust mode, but the display channel LED continues to flash.

The adjust mode can be used when:

- A manual cutout is made on a channel.
- An Input channel is applied a simulated value.
- An analog channel changes its limits.
- A channel changes its delay-times, i.e. the time a signal must have passed the high/low limit (analog) or opposite value (binary) before the DMS2100i system regard it as a change of state.

Other fields, which are displayed in the channel status screen, are not to be adjusted; e.g. the crew on board the ship cannot change the alarm priority.

Example:

ME START AIR PRESSURE LOW	?
ME1CFG01	-5.05 bar
DEV.	FAIL
UTC TIME	: 00-08-22 08:13:26
L1: LOW PRES	LOW LIMIT 10.00 Prio 1
ME START AIR PRESSURE LOW	?
L1: DELAY (SEC)	ON: 8 OFF: 8
CUT-OUT:	MAN: OFF
SIMULATION:	OFF
ME START AIR PRESSURE LOW	?
TYPE	: ANALOG
ALARM GROUPS	: - - - -
ALARM SYSTEM	: DMS ALM SYS
ME START AIR PRESSURE LOW	?
IN DATALOG	: YES
MAIN INPUT	: SENSOR INPUT 01/00/01/03
END OF DISPLAY CHANNEL	

Example: The analog value for a channel is displayed together with the high and the low alarm limit.

By use of [<], [>], [▲] and [▼] the operator may scroll through the different parameters in the channel set-up. The available parameters are listed below:

No:	Presentation lay-out at the LCD display:	Explanation:
1	L1: LOW PRES LOW LIMIT <value>	Alarm low limit 1 for Starting Air Pressure
2	L1: DELAY (SEC) ON: <value>	Alarm delay time for turning ON
3	L1: DELAY (SEC) OFF: <value>	Alarm delay time for turning OFF
4	CUT-OUT: MAN: <value>	Manual cut-out can be selected ON or OFF
5	SIMULATION: <value>	Simulation of starting air press. selected ON or OFF

5.6.1 Entering of Numerical Data and Texts

Numerical data and text are entered via the alpha/numerical keys.

If the operator has to enter a numerical value, only the numerical part of the alpha/numerical keys are active. The entry procedure is as for a normal pocket calculator.

If the operator has to change a text, both the numbers and characters can be entered. The entry follows the standard principles used for mobile telephones.

If a key is pressed, the first stated character on the key is displayed. If the key is pressed again, the second stated character on the key is displayed. If another key is pressed, the entry is accepted and the cursor moves one position to the right. If the operator has to enter the same character twice in a row following each other, he must press [↵] to accept the first entry and to proceed to the next.

Example - Text Entry:

The operator has to enter G11X.

<i>Operator Enters</i>	<i>Display Shows</i>
[3 GHI]	<u>3</u>
[3 GHI]	<u>G</u>
[1 ABC]	G <u>1</u>
[↵]	G1
[1 ABC]	G1 <u>1</u>
[8 VWX]	G11 <u>8</u>
[8 VWX]	G11 <u>V</u>
[8 VWX]	G11 <u>W</u>
[8 VWX]	G11 <u>X</u>

The [0 #] is used to enter space, special characters and national characters (e.g. _,Ü,Æ). I.e. the number of characters and which characters that is hidden below the [0 #] key depends of the national language that is selected.

The [←] and [→] is used to step backward/forward in the entered text, without clearing the already entered characters.

5.7 Maintenance Mode.

Maintenance offers a wide range of different functions. Most of them are related to the restricted access levels one to four, where four is the highest priority level of the DMS2100i. Only Lyngsø Marine Service Engineers have access to the items protected by access level four as indicated in the overview list below.

When [**MAINTENANCE**] is pressed, the Operating Panel displays the first of several maintenance functions:

SELECT MAINTENANCE FUNCTION							
S	DISPLAY	S	VERSION	S	SET	S	MORE
1	TIME	2	CONTROL	3	TIME	4	

The operator can now browse through the headings of the maintenance functions by using the softkey S4. To select the displayed maintenance function, the actual softkey S1 to S3 is pressed. Pressing [**ESC**] makes the Operating Panel return to basic mode.

The Maintenance LED flashes while the system is in either commissioning mode or LM password level four.

Dependent on the panel location and functionality, a restricted set of the following maintenance functions are available, i.e. the Bridge Panel of the DMS2100i only includes display/set of time, version control and lamp test:

SELECT MAINTENANCE FUNCTION:							
S	DISPLAY	S	VERSION	S	SET	S	MORE
1	TIME	2	CONTROL	3	TIME	4	
S	LAMP	S	SELECT	S	COMMISS	S	MORE
1	TEST	2	UTC/LT	3	MODE	4	
S	CHANGE	S	CHANGE	S	CHANGE	S	MORE
1	PW LEV1	2	PW LEV2	3	PW LEV3	4	
S	CHANGE	S	SYSTEM	S	LOP-UCS	S	MORE
1	PW LEV4	2	PW LEV	3	CONTROL	4	
S	WATCH	S	STORE	S		S	MORE
1	DOG TST	2	SETUP	3		4	

- Display time and date.
- View load sequential date and number.
- Set time and date (priv. access level 1).
- Lamp Test.
- Select between UTC and Local Time (priv. access level 1).
- Enter/Leave commissioning mode (priv. access level 4).
- Change password - level 1 (priv. access level 2).

- Change password - level 2 (priv. access level 3).
- Change password - level 3 (priv. access level 3).
- Change password - level 4 (priv. access level 4).
- Enter/Leave system password level (priv. access level 4).
- Disable LOP control of UCS - Global disable (priv. access level 3). Optional.
- Watch dog activation (priv. access level 4).
- Store Setup (priv. access level 4).

The functions/sub-screens are described more in the following.

5.7.1 Display Time and Date

This facility is used for displaying the actual time and date. Next to these values, the actual formats are specified; hence, the operator will know whether the date is May 10th, or Oct 5th.

DISPLAY TIME & DATE		
	HH:MM:SS	YY:MM:DD
LOCAL TIME	: 08:40:05	00.08.18
UTC TIME	: 08:40:05	00.08.18

By pressing [**ESC**] the Operating Panel returns to the maintenance screen.

5.7.2 View Program Version, Load Sequential Date and Number

Is used for viewing the release number and sequential date/number of the DMS2100i installed:

VIEW PROGRAM VERSION/DATABASE VERSION		
VERSION/TYPE NO.	:	5.01 / 970.409.101
DATABASE/SEQ	:	20000727 / 137
SHIP NAME	:	Name of the ship

By pressing [**ESC**] the Operating Panel returns to the maintain screen.

5.7.3 Set Time and Date (priv. access level 1)

If set time and date is selected, the operator first has to enter a password and then select local or UTC time:

ENTER PASSWORD	- LEVEL	1:	_
----------------	---------	----	---

SET TIME & DATE			
S	SET	S	SET
1	UTC	2	LT

When UTC or local time is selected, the operator has to select between:

- Set the time.
- Set the date.
- Increase/Decrease the time with xx minutes. This can be used when passing on to a new time zone. Only relevant for local time.

When UTC Time is selected the following display appears:

SET UTC TIME & DATE			
S	SET	S	SET
1	TIME	2	DATE

Set Time (only valid for “Set UTC” Menu):

When [S1]/SET TIME is pressed a new UTC time can be entered:

SET UTC TIME	
ENTER NEW TIME :	11:15:35
CURRENT TIME :	11:16:55 (HH:MM:SS)

The entry of a new UTC time follows the guidelines of entering numbers, see section 5.6.1. Once the selection is finished, the operator enters [ENT] and the Operating Panel updates the date, and returns to the “Set UTC time & date”-screen. By pressing [ESC] the Operating Panel skips the date correction and returns to the “Set UTC time & date”-screen.

Set date (only valid for “Set UTC” Menu):

When [S2]/SET DATE is pressed a new date can be entered:

SET UTC DATE			
ENTER NEW DATE :	00.08.18		
CURRENT DATE :	00.08.18	(YY:MM:DD)	

The entry of a new date follows the guidelines of entering numbers, see section 5.6.1. Once the selection is finished, the operator press the [ENT] key and the Operating Panel updates the date, and returns to the “Set UTC time & date”-screen. By pressing [ESC] the Operating Panel skips the date correction and returns to the “Set UTC time & date”-screen.

When Local Time is selected the following display appears:

SET LOCAL TIME							
S	SET	S	ZONE	S	TIME	S	TIME
1	TIME	2	ADJUST	3	+60	4	-60

Set Time (Local Time setup):

When [S1]/SET TIME is pressed a new offset value can be entered relating local time to UTC time:

SET LOCAL TIME			
UTC TIME :	09:51:40		
NEW OFFSET :	10:00		
CURRENT OFFSET :	10:00	(+ -HH:MM)	

The entry of a new time follows the guidelines of entering numbers, see section 5.6.1. Once the selection is finished, the operator press the [ENT] key and the Operating Panel updates the time, and, returns to the “Set Local Time”-screen. By pressing [ESC] the Operating Panel skips the time update and returns to the “Set Local Time”-screen.

Zone Adjust:

When [S2]/ZONE ADJUST is pressed a new adjust value can be entered:

ENTER NEW TIME ZONE ADJUST VALUE:			
ENTER NEW VALUE:	60		
CURRENT VALUE :	60 MINUTES		

The entry of a new time follows the guidelines of entering numbers, see section 5.6.1. Once the selection is finished, the operator press the [ENT] key and the Operating Panel updates the +/- time, and, returns to the “Set Local Time”-screen. By pressing [ESC] the Operating

Panel skips the +/- time update and returns to the “Set Local Time”-screen.

Change Time Relatively:

If [**S3**]/TIME+<Zone Adjust> or [**S4**]/TIME-<Zone Adjust> is selected, the following display appears respectively – xx is the current value of <Zone Adjust> described above:

CHANGE LOCAL TIME			
INCREASE THE PRESENT TIME xx MIN.			
S		S	
1	QUIT	2	ACCEPT

CHANGE LOCAL TIME			
DECREASE THE PRESENT TIME xx MIN.			
S		S	
1	QUIT	2	ACCEPT

The value of xx or <Zone Adjust> is the number of minutes that the present time will be increased/decreased when pressing [**S2**]. The value is displayed in the standard format. The value is normally set to 20, but it can be customised to any value between 1 and 60.

5.7.4 Lamp Test

Activation of the Lamp Test softkey results in sounding buzzer, flashing indication field “FAULT” and all LEDs of the Operating Panel turned ON until [**ESC**] is pressed.

The following picture appears during Lamp Test:

*** LAMP TEST -- PRESS [ESC] TO STOP ***
--

5.7.5 Select UTC or Local Time (priv. access level 1)

If select UTC or Local Time is chosen, the operator first has to enter a password and then select local or UTC time:

ENTER PASSWORD	- LEVEL	1:	_
----------------	---------	----	---

SELECT UTC OR LT TIME			
S		S	SELECT
1	QUIT	2	LT

5.7.6 Enter Commissioning Mode (priv. access level 4)

Commissioning mode means that activation of [**ALARM ACKN**] - when in Basic or Alarm List mode - will acknowledge all alarms, even though they are not displayed on the LCD.

To enter commissioning mode the operator must enter a password successfully. Hereafter the following display appears:

ENTER COMMISSIONING MODE:		OFF
S	ON	
1		

The maintenance LED flashes as long as the system is in commissioning mode (or in System password level). Once the commissioning mode is entered, it is maintained until it is deselected from this menu or the Gamma Micro CPU is reset.

5.7.7 Change Password - Level N (priv. access level N/N+1)

If one of the password changing functions are selected, the following display is presented:

ENTER PASSWORD	- LEVEL	N:	_
----------------	---------	----	---

When a correct existing password is entered for level N or any higher level, the operator is prompted for a new password as well as confirmation of the new password for level N:

CHANGE PASSWORD			
ENTER NEW PASSWORD	-	LEVEL	N: _
CONFIRM PASSWORD	-	LEVEL	N: _

A valid password may consist of any number of characters from two to six.

Each character must be a digit from zero to nine. Any character is echoed as * at the LCD display of the DMS2100i Operating Panel.

A password entry is finished by pressing [ENT].

5.7.8 Enter System Password Level (priv. access level 4)

If the system password level is selected, the following display is presented:

ENTER PASSWORD	-	LEVEL	4: _
----------------	---	-------	------

Enter system password level (level 4) means that all Operating Panels enter the highest password level. The password level is maintained until it is deselected again. This means that a service engineer can set the system in the system level and then perform all functions without entry of password. To enter the system password level the operator must enter a password successfully, thereafter, the following display appears:

ENTER SYSTEM PASSWORD LEVEL		OFF
S	ON	
1		

The maintenance LED flashes as long as the system is in system password level. Once the level is entered, it is maintained until it is deselected from this menu or the Gamma Micro CPU is reset.

5.7.9 Select LOP-UCS Control

NOTE: This function is only included with the Maintenance functions in a fully integrated environment including the DMS2100i and the UMS2100 Alarm System.

5.7.10 Watch Dog Activation (priv. access level 4)

Entering watchdog activation the operator is prompted for the highest priority level. When this is entered the following display appears for 15 seconds. Thereafter the DMS2100i system is restarted with the same functionality as if the reset button had been pressed at the Gamma Micro CPU:

ENTER PASSWORD - LEVEL 4 : _

ETERNAL LOOP ENTERED!

The watch dog activation resets the DMS2100i system, however, the database remain intact, i.e. definition of channels, names of persons, passwords, etc.

5.7.11 Store Setup (priv. access level 4)

When entering S2: "Store Setup" activation the buzzer sounds for one second and the operator is prompted for the highest priority level. When this is entered the present setup of the DMS2100i is stored, the Operating Panel returns automatically to the Maintenance Menu and the buzzer sounds for one second:

ENTER PASSWORD - LEVEL 4 : _

SELECT MAINTENANCE FUNCTION

S	WATCH	S	STORE	S		S	MORE
1	DOG TST	2	SETUP	3		4	

5.8 Dimmer Mode

In dimmer mode, the operator is able to control:

- The LCD displays background light
- View angle adjustment of the LCD display
- The LED illumination.
- The folio background light of the keys.

When [**DIMMER**] is pressed, the LCD display prompts the operator to select what he wants to dim:

SELECT DIMMER FUNCTION:							
S	LCD	S	VIEW	S	LED	S	BACK-
1	DISPLAY	2	ANGLE	3	DISPLAY	4	GROUND

When the function is selected, the intensity is adjusted by use of the [▲] and [▼] keys. The intensity is updated immediately, and the LCD display indicates the present selection as shown below:

ADJUST THE LCD INTENSITY										▲▼
SETTING: ****..										
ADJUST BY USE OF: ▲▼										

6. DMS2100i Alarm Indication and Trouble Shooting

New alarms in the DMS are activating the internal buzzer in the DMS panel, and shown in clear text on the Basic Mode Overview Picture when they come up, i.e. the oldest unacknowledged alarm is shown on line four. When the alarm has been acknowledged by first pressing [**STOP HORN**] and then [**Alarm Ackn.**], it will disappear from line four (it can now be found in the Alarm List selected by means of the [**Alarm List**] key), and the next unacknowledged alarm will show up on line four.

A Customising Tool database printout containing all included alarms in this actual DMS2100i configuration is appended at the end of this chapter. The following table contains a description and a trouble shooting description for all possible alarms in the DMS2100i, but please note that only the alarms in the appended print-out is included in this system. The alarms are sorted alphabetically according to column DMS ALARM TEXT:

DMS ALARM ID:	DMS ALARM TEXT	DESCRIPTION	TROUBLE SHOOTING
DMSA21F1	Autom. Supply (IFM401) FUSE F1	24Vdc supply for Automatic control sensors missing.	Check fuse F1 on the IFM401 module, and input to REM401 module DMS1M102, input 13
DMS1ELSH	Bridge Telegraph El-shaft fail	Only if Electric Shaft failure alarm is going to the DMS instead of directly to the alarm system	Check the Electrical Shaft system for the Bridge Telegraph for failure indications or power failure
DMS_MALF	DMS System Malfunction	Optional Common alarm for all new DMS supervision alarms	Check the DMS for other module and fuse failures
DMS1T011	DMS1T01 Pickup 1 fail	Cable failure on DMS1T01 Tacho Adapter Module Pickup number 1	Check the connections for Pickup number 1 on the Tacho Adapter Module
DMS1T012	DMS1T01 Pickup 2 fail	Cable failure on DMS1T02 Tacho Adapter Module Pickup number 2	Check the connections for Pickup number 2 on the Tacho Adapter Module

DMS ALARM ID:	DMS ALARM TEXT	DESCRIPTION	TROUBLE SHOOTING
DMSTOUMS	DMS-Alarm Syst. Interface Fail	Only if Serial Modbus Interface to Alarm System	Check wiring from DMS SIO module to Alarm System serial interface input module
DMSTOEGS	DMS-EGS2000 Interface Fail	Only if Serial Interface to EGS2000	Change to Manual ECR control, because the EGS2000 loses its RPM setpoint and Governor Stop signal. Check wiring from DMS SIO module to EGS SIO module
Gx_to_M	GAMMA x: Alarm Net	Error on the Alarm net communication to the Master Gamma. Only in case of Alarm net integration with UMS2100	Check the Alarm net connection from the DMS to the Master Gamma. This can be made as RTN2100 net from a RS485 SIO channel, or a Stella net from a DSN module.
Gx_LOP1	GAMMA x: Comm. To PCS Panel 1	Communication error from Gamma CPU to ECR panel	Check power supply to panel, if OK check connection from Gamma SIO connection to ECR panel.
Gx_LOP2	GAMMA x: Comm. To PCS Panel 2	Communication error from Gamma CPU to Bridge	Check power supply to panel, if OK check connection from Gamma SIO connection to Bridge panel.
Gx_STAT	GAMMA x: Database Status	The loaded database and program in the Gamma Flash Prom is disturbed	Call Lyngsø Marine for service. If possible load the Gamma from the connected operator station.
SNyTOx	GAMMA y: STL Net to GAMMA x	Error on the Alarm - and Control net from the DMS to the master Gamma and Graphical Operator Station. Only in case of Alarm/Control net integration with UMS/UCS2100	Check the Stella net connection from the DSN module in the DMS to the Master Gamma

DMS ALARM ID:	DMS ALARM TEXT	DESCRIPTION	TROUBLE SHOOTING
ME1GIF03	Governor Cancel Limits	Cable failure on the Woodward Governor Cancel Limits valve. NOT included with serial interface to EGS2000	Check fuse F3x and wiring to the Woodward Governor Cancel Limits valve
DMS1_EGS	Governor Failure	Only if EGS2000 failure alarm is going to the DMS instead of directly to the alarm system	Check for alarms on the EGS2000 Control Unit panel
ME1GOVSP	Governor Speedsetting Error	Failure on Speed Setting Output signal to Governor	Check wiring to I/P Converter
ME1GIF02	Governor Stop	Cable failure on the Woodward Governor Stop valve. NOT included with serial interface to EGS2000	Check fuse F3x and wiring to the Woodward Governor Stop valve
DMSA21F4	LPtest Supply (IFM401) FUSE F4	24Vdc supply for Lamp Test missing.	Check fuse F4 on the IFM401 module, and input to REM401 module DMS1M102, input 16
MANSLOWD	Manual Slowdown, Reduce RPM	Manual Slowdown Alarm input is activated	Reduce manually RPM setpoint to Slow
DMSA21F2	Manual Supply (IFM401) FUSE F2	24Vdc supply for Manual control sensors missing.	Check fuse F2 on the IFM401 module, and input to REM401 module DMS1M102, input 14
ME1ST07	ME Ahead Valve Failure	Cable failure on the Ahead solenoid valve	Check fuse F32 and wiring to Ahead valve
ME1ST08	ME Astern Valve Failure	Cable failure on the Astern solenoid valve	Check fuse F33 and wiring to Astern valve
ME1_BRGC	ME BRG TLG CMD Failure	Bridge setpoint potentiometer cable failure alarm	Check the wiring of the Bridge Telegraph setpoint potentiometer
ME1_BRGA	ME BRG TLG Misaligned	Compares analog Bridge stop setpoint with binary stop switch	Check that the Bridge Telegraph stop switch is activated when the Bridge Telegraph is in stop position

DMS ALARM ID:	DMS ALARM TEXT	DESCRIPTION	TROUBLE SHOOTING
ME1_POS	ME Control position fail	The Control Position feedback's are inconsistent with the present Control Position	Check wiring and activation of: Remote pressure switch P9, Manual ECR/Auto Bridge changeover switch in ECR console and corresponding DMS inputs Local pressure switch P2, Governor remote engaged switch S6
ME1_SCR1	ME Critical Speed Range 1	Main Engine running inside critical speed range 1	If RPM setpoint from DMS to governor is outside the critical speed limit, check the Governor, otherwise check the DMS setpoint system.
ME1_SCR2	ME Critical Speed Range 2	Main Engine running inside critical speed range 2	If RPM setpoint from DMS to governor is outside the critical speed limit, check the Governor, otherwise check the DMS setpoint system.
ME1SHD04	ME DPS: Emergency Stop	The DPS has stopped the Main Engine due to activation of one of the Emergency Stops	Se on the DPS panel-Alarm List, which Emergency stop is activated. It must be de-activated and the Telegraph lever put in stop position to reset, before trying to start again
ME1SHD05	ME DPS: Overspeed Shutdown	The DPS has stopped the Main Engine due to an Overspeed Shutdown	
ME1_ECRC	ME ECR TLG CMD Failure	ECR Setpoint cable failure alarm	Check the wiring of the ECR Telegraph setpoint potentiometer. Only used for Order recorder

DMS ALARM ID:	DMS ALARM TEXT	DESCRIPTION	TROUBLE SHOOTING
ME1_ECRA	ME ECR TLG Misaligned	Compares analog ECR stop setpoint with binary stop switch	Check that the ECR Telegraph stop switch is activated when the ECR Telegraph is in stop position
ME1_EMGC	ME EMG TLG CMD Failure	Emergency Telegraph potentiometer cable failure alarm	Check the wiring of the ECR Telegraph set-point potentiometer. Only used for Order recorder
ME1_LLC	ME Limits Cancelled	Main Engine limits has been cancelled by pressing the “Limits Cancel “ key on the DMS panel	Press the “Limits Cancel” key once more to remove the Load Limit Cancel again
ME1_NOF	ME Max No Start Exceeded	The DMS has reached the maximum number of start attempts, normally 3	Put the Telegraph lever in stop position to reset, before trying to start again
ME1SHD07	ME Mechanical Shutdown alarm 1	DMS2100i not used	
ME1SHD08	ME Mechanical Shutdown alarm 2	DMS2100i not used	
ME1SHD09	ME Mechanical Shutdown alarm 3	DMS2100i not used	
ME1SHD10	ME Mechanical Shutdown alarm 4	DMS2100i not used	
ME1_SHDN	ME NON Cancellable Shutdown	DMS2100i not used	
ME1_SLDN	ME NON Cancellable Slowdown	A NON-Cancellable Slowdown, e.g. the Oilmist Detector, has been activated	When the NON-Cancellable Slowdown condition has been cleared, it can be reset the normal way
ME1_REPS	ME Repeated Start	The DMS has made an unintended stop, and will be automatically started again	Put the Telegraph lever in stop position to reset, before trying to start again
ME1_SHDA	ME Shutdown Active	DPS has stopped the ME due to a Shutdown	When the Shutdown condition has been cleared, put the Telegraph lever in stop position to reset, before trying to start again

DMS ALARM ID:	DMS ALARM TEXT	DESCRIPTION	TROUBLE SHOOTING
ME1_SHDC	ME Shutdown Cancelled	The DPS Shutdown has been cancelled from the “Shutd. Cancel” key, either from the DPS panel or from the DMS panel in control.	Press the “Shutd. Cancel” key once more to remove Shutdown Cancel, when it is no longer necessary
ME1SHD20	ME Shutdown input alarm 1	DMS2100i not used	
ME1SHD21	ME Shutdown input alarm 2	DMS2100i not used	
ME1SHD22	ME Shutdown input alarm 3	DMS2100i not used	
ME1SHD23	ME Shutdown input alarm 4	DMS2100i not used	
ME1SHD24	ME Shutdown input alarm 5	DMS2100i not used	
ME1SHD25	ME Shutdown input alarm 6	DMS2100i not used	
ME1SHD26	ME Shutdown input alarm 7	DMS2100i not used	
ME1SHD27	ME Shutdown input alarm 8	DMS2100i not used	
ME1SHD28	ME Shutdown input alarm 9	DMS2100i not used	
ME1_SHDP	ME Shutdown Prewarning	A Shutdown Input to the DPS has been activated, and will activate the Shutdown and stop the engine in a few seconds.	If necessary, press the “Shutd. Cancel” key to cancel the Shutdown before it is stopping the main engine.
ME1_SLDA	ME Slowdown Active	DMS has reduced the RPM setpoint to the Governor to Slow due to a Slowdown input is activated. Press the “Slow Down” key on the DMS panel to display the list of possible active Slowdown inputs	When the Slowdown condition has been cleared, press the “Slowd. Reset” key on the DMS panel or reduce the Telegraph lever setpoint on the active control position below Slow position to reset, before increasing the speed again Note: the DMS can be configured to accept reset only from ECR
ME1_SLDC	ME Slowdown Cancelled	The DMS Slowdown has been cancelled from the “Slowd. Cancel” key from the DMS panel in control.	Press the “Slowd. Cancel” key once more to remove Slowdown Cancel, when it is no longer necessary

DMS ALARM ID:	DMS ALARM TEXT	DESCRIPTION	TROUBLE SHOOTING
ME1SLD01	ME Slowdown input 1	ME Slowdown input 1 is activated or fail	When indicating cable failure, check the wiring from the IOM402 module to the sensor contact and the 8k2 kOhm cable fail resistor
ME1SLD10	ME Slowdown input 10	ME Slowdown input 10 is activated or fail	As for input 1
ME1SLD11	ME Slowdown input 11	ME Slowdown input 11 is activated or fail	As for input 1
ME1SLD12	ME Slowdown input 12	ME Slowdown input 12 is activated or fail	As for input 1
ME1SLD13	ME Slowdown input 13	ME Slowdown input 13 is activated or fail	As for input 1
ME1SLD14	ME Slowdown input 14	ME Slowdown input 14 is activated or fail	As for input 1
ME1SLD02	ME Slowdown input 2	ME Slowdown input 2 is activated or fail	As for input 1
ME1SLD03	ME Slowdown input 3	ME Slowdown input 3 is activated or fail	As for input 1
ME1SLD04	ME Slowdown input 4	ME Slowdown input 4 is activated or fail	As for input 1
ME1SLD05	ME Slowdown input 5	ME Slowdown input 5 is activated or fail	As for input 1
ME1SLD06	ME Slowdown input 6	ME Slowdown input 6 is activated or fail	As for input 1
ME1SLD07	ME Slowdown input 7	ME Slowdown input 7 is activated or fail	As for input 1
ME1SLD08	ME Slowdown input 8	ME Slowdown input 8 is activated or fail	As for input 1
ME1SLD09	ME Slowdown input 9	ME Slowdown input 9 is activated or fail	As for input 1
ME1_SLDP	ME Slowdown Prewarning	A Slowdown Input to the DMS has been activated, and will activate the Slowdown of the engine in a few seconds.	If necessary, press the “Slowd. Cancel” key to cancel the Slowdown before it is reducing the RPM setpoint to slow
ME1_SLF	ME Slowturning Fail	ME has been slowturning without the tacho system counting 1.5 revs within the time-out	Put the Telegraph lever in stop position to reset, before trying to start again
ME1ST05	ME Slowturning Valve Failure	Cable failure on the Slowturning solenoid valve	Check fuse F36 and wiring to Slowturning valve
ME1ST10	ME St.air distrib. AH 1 Valve	Cable failure on the Start Air Distributor Ahead valve 1. MCC engines only	Check fuse F3x and wiring to Start Air Distributor Ahead valve 1

DMS ALARM ID:	DMS ALARM TEXT	DESCRIPTION	TROUBLE SHOOTING
ME1ST11	ME St.air distrib. AH 2 Valve	Cable failure on the Start Air Distributor Ahead valve 2. MCC engines only, number of cylinders > 9	Check fuse F3x and wiring to Start Air Distributor Ahead valve 2
ME1ST12	ME St.air distrib. AS 1 Valve	Cable failure on the Start Air Distributor Astern valve 1. MCC engines only	Check fuse F3x and wiring to Start Air Distributor Astern valve 1
ME1ST13	ME St.air distrib. AS 2 Valve	Cable failure on the Start Air Distributor Astern valve 2. MCC engines only, number of cylinders > 9	Check fuse F3x and wiring to Start Air Distributor Astern valve 2
ME1CFG01	ME St.Air Pressure Low	The start air pressure is below the 15 bar limit for start blocking	Check the start air pressure
ME1CFG01	ME St.Air Transmitter failure	Cable failure on the analog start air pressure transmitter	Check the wiring to the Start Air pressure transmitter
ME1_SAF	ME Start Air Time Exceeded	ME has been running on starting air without reaching the firing speed within the time-out	Put the Telegraph lever in stop position to reset, before trying to start again
ME1_BLC	ME Start Block Cancelled	Main Engine Start Blocking has been cancelled by the operator	Press the “Select key/DMS Start Stop System” and use S1-Cancel Off to remove Cancel Start Blocking again
ME1_BLA	ME Start Blocked	Main Engine is Start Blocked	Press the “Start Block” key on the DMS panel to browse the list of startblockings
ME1ST03	ME Start Valve Failure	Cable failure on the Start solenoid valve	Check fuse F30 and wiring to Start valve
ME1ST04	ME Stop Valve Failure	Cable failure on the Stop solenoid valve	Check fuse F31 and wiring to Stop valve

DMS ALARM ID:	DMS ALARM TEXT	DESCRIPTION	TROUBLE SHOOTING
ME1_RPM1	ME Tacho 1 Error	DMS RPM signal lower than DPS tacho signal	Press DMS panel "Select/DMS Control Functions/ME Tacho System" to select between tacho 1 (DMS) and Tacho 2 (DPS) and Auto select. From this display press "Status" to browse the RPM inputs and fail indications for both Tacho 1 and 2.
ME1_RPM2	ME Tacho 2 Error	DPS RPM signal lower than DMS tacho signal	As for Tacho 1 Error
DMS1AI01	Module DMS1AI01 (AEM402) Error	Error on Analog input module AEM402	Check ribbon cable from Gamma CPU to AEM402. If OK change module.
DMS1C001	Module DMS1C001 (SIO) Error	Error on the first Serial Interface module	Check ribbon cable from Gamma CPU to SIO module. If OK change module.
DMS1C002	Module DMS1C002 (SIO) Error	Error on the second Serial Interface module	Check ribbon cable from first SIO module to second SIO module. If OK change module.
DMS1C003	Module DMS1C003 (DSN) Error	Error on the Dual STELLA Net module. Only in case of Alarm/Control integration via Stella Net to UMS/UCS2100	Check ribbon cable from first SIO module to second DSN module. If OK change module.
DMS1M101	Module DMS1M101 (IOM402) Error	Error on the Input Output Module for digital supervised input and output	Check ribbon cable last SIO/DSN module to MIC40 adapter and from MIC40 adapter to IOM402 module. If OK change module.
DMSM101F	Module DMS1M101 (IOM402) Fuse	24Vdc supply on IOM402 module DMS1M101 missing	Check the fuse on IOM402 module DMS1M101
DMS1M102	Module DMS1M102 (REM401) Error	Error on the first Relay output and digital Input Module	Check ribbon cable from IOM402 to the REM402 module. If OK change module.

DMS ALARM ID:	DMS ALARM TEXT	DESCRIPTION	TROUBLE SHOOTING
DMSM102F	Module DMS1M102 (REM401) Fuse	24Vdc supply on REM401 module DMS1M102 missing	Check the fuse on REM401 module DMS1M102
DMS1M103	Module DMS1M103 (REM401) Error	Error on the second Relay output and digital Input Module	Check ribbon cable from the first REM401 to the last REM402 module. If OK change module.
DMSM103F	Module DMS1M103 (REM401) Fuse	24Vdc supply on REM401 module DMS1M103 missing	Check the fuse on REM401 module DMS1M103
DMS1M104	Module DMS1M104 (AAM401) Error	Error on the Analog Output Module.	Check ribbon cable from the last REM401 to the AAM401 module. If OK change module.
DMSA21F3	Sensor Supply (IFM401) FUSE F3	24Vdc supply for additional sensors missing.	Check fuse F3 on the IFM401 module, and input to REM401 module DMS1M102, input 15
STRTFAIL	Start Failure Alarm Output	Start air or Slowturning time-out or max. no of start attempts	Put the Telegraph lever in stop position to reset, before trying to start again

The buzzer is started for a short time “Beep” at Bridge Panels or ECR Panel dependent on control location when:

- Activation of DMS Panel Hardkeys on a panel which is not in control
- Activation of DMS Control Functions Softkeys on a panel which is not in control
- Start request for Main Engine with one or more start blockings.

7. DMS2100i Customising Tool Print-Out

7.1 Input/Output List Terminal Board Report

This section contains a Terminal Board Report printout from the CT2100 Customising Tool, listing all Input and Output channels on the DMS2100i Input/Output Modules.

7.2 Output Functions List Report

This section contains a Output Functions report print-out from the CT2100 Customising Tool, listing all Output channels which are made as a software function by the CT2100 Customising Tool.

7.3 DMS2100i Function Blocks List Report

This section contains a DMS Function Block Report print-out from the CT2100 Customising Tool, with a page for each of the software Function Blocks that are used in the DMS2100i, and for each Function Block all Inputs to and Outputs from the Function Block is listed.

8. DMS2100i Components and Spare-parts

8.1 Hardware Components List

The DMS2100i contains the following hardware modules:

NAME	DESCRIPTION	NO:	TYPE NUMBER
Panel	DMS Operator Panel	2	962.017.500
GAMMA	Gamma micro PLC/CPU Module	1	962.002.800
SIM401	Serial Interface Module with two channels for connection to the Tacho Adapter, EGS2000 Governor, optional Serial link to alarm system, optional Manoeuvring printer and a service/load channel	1 or 2	962.002.300
DSN401	Dual Stella Net module for optional integration with UCS2100 Alarm- and Control System	0 or 1	962.002.600
TAM	Tacho Adapter Module for RPM pickups	1	962.015.000
AEM402	8 channels Analog Input Module, Resistance, Voltage or mA inputs	1	962.004.200
MIC40	Input/Output Adapter, Gamma to digital I/O modules	1	962.002.900
IOM402	16 Digital Input and with cable supervision 12 Digital Output with cable supervision	1	962.004.700
REM401	16 Digital Input and 8 Relay Output	2	962.003.400
AAM401	4 channels Analog Output Module, 0/4-20 mA or 0 - 10 Volt	1	962.009.000
FIM405	Filter Module for 24 Vdc Power Supply	1	962.004.100
IFM401	Interface modules for solenoid valve outputs	1	962.003.600
IFM402	Interface module for digital input & lamp indications	1	962.003.700
NEC432	24V DC/DC converter for Start Air Pressure	1	962.009.700

The DPS2100 Safety System included in the DMS2100i Main Cabinet is made by means of the following modules:

NAME	DESCRIPTION	N0	TYPE NUMBER
Panel	DPS Operator Panel	1	962.019.000
DZM 402	RPM Tacho Module	1	962.003.110
IOM 402	16 Digital Input and 12 Digital Output, both with cable supervision	2 or 3	962.004.700
FIM 405	Filter Module for 24 Vdc Power Supply	1	962.004.100

8.2 HW Modules Layout and Jumper Settings

This section contains a Layout drawing for each module included in the DMS2100i showing jumpers, set-up switches, LED indications, EPROM positions etc.

8.3 Spare-part List

The appended Spare Parts List show the fuses and lamps, which is included in the standard spare part set as required by the Classification Societies.

Of course we will be glad to offer you a bigger or full set of spare parts. All units mentioned previously in this chapter could be relevant. Please contact our Spare Parts department for price and delivery time.

End of document.

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