MAN B&W

MOP DESCRIPTION 1008

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Technical Documentation Low-speed (GMD1-CPH)

50-98ME/ME-C

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1. Important!

WARNING

Please note that access to the areas of the MOP computer behind the user interface screens shown in the appendix of this manual, is restricted to personnel authorised by MAN Diesel & Turbo.

Altering items in the restricted area of the MOP may result in engine failure.

2. General

The Engine Control System (ECS) consists of a set of controllers, *see Plate 70317*.

Briefly described, the functions of the controllers are:

EICU	The Engine Interface Control Units handle the interface to external systems.
ECU	The Engine Control Units perform the engine control functions: engine speed, running modes and start sequence.
ACU	The Auxiliary Control Units control the pumps of the hydraulic system unit and the auxiliary blowers.
CCU	The Cylinder Control Units control the ELFI/ELVA and FIVA valves, starting air valves, and the ME cylinder lubricators.
SCU	The Scavenge Control Unit controls both the Exhaust Gas Bypass (both on/off as well as variable bypass) and VT- Variable Turbocharging. (Optional)
MOP	The engineers' interface to the ECS.

Normal Working Sequence

The following is an example of how the control units of the ECS work together during normal operation.

EICU

The EICUs receive navigational inputs from the control stations and select the active station based on signals given by the 'Remote Control' system.

The main navigational command is the speed set point (requested speed and direction of engine rotation).

The main navigational command is the speed set point (requested speed and direction of engine rotation).

In the EICUs the raw speed set point is processed by a series of protective algorithms. These ensure that the speed set point from which the engine is controlled is never harmful to the engine. An example of such an algorithm is the 'Barred speed range'.

Now the processed speed set point and the selected engine running mode request are available via the control network to be used by the ECUs as a reference for the speed control and engine running mode control.

The two redundant EICU units operate in parallel.

ECU

The engine speed control requires that the amount of fuel is calculated for each cylinder firing. The calculation made by the speed controller (ECU) is initiated in relation to the crankshaft position, so that the execution is started just in time to make the fuel injection. This is controlled by the tacho function.

The output from the speed controller is a 'request for fuel amount' to be injected for the next combustion. This request is run through different protective algorithms – the fuel limiters – and the 'resulting amount of fuel command' is produced.

Based on the algorithm of the selected engine running mode, the injection profi le is selected, the timing parameters for the fuel injection and exhaust valve are calculated and the pressure set point for the hydraulic power supply derived.

Based on the user input of fuel sulphur content, minimum feed rate etc., the resulting cylinder lubrication feed rate for each individual cylinder unit is calculated.

The resulting amount of fuel command, the requested fuel injection profile, the timing parameters and the resulting cylinder lubrication feed rate amount are all sent to the CCU of the cylinder in question via the control network. Likewise, the hydrulic pressure set point is sent to all ACUs.

For redundancy purposes, the control system comprises two ECUs operating in parallel and performing the same task, one being a hot stand-by for the other. If one of the ECUs fail, the other unit will take over the control without any interruption.

CCU

In appropriate time for the next firing, the CCU ensures that it has received new valid data. Where after the injection profile start angle is set up using the tacho function.

On the correct start angle the injection is initiated and is controlled according to the fuel amount command and the injection profile command.

When the injection is completed, the exhaust open and close angles are set up using the tacho function and the exhaust valve control signal is then activated on the appropriate crank angles.

The cylinder lubricator is activated according to the feed rate amount received from the ECU.

All of the CCUs are identical, and in the event of a failure of the CCU for one cylinder, only this cylinder will automatically be put out of operation. (Running with cylinders out of operation is explained in Chapter 704-04.

ACU

The ACUs control the pressure of the Hydraulic Power Supply system and the electrical start-up pumps using the 'Pressure Set point' given by the ECUs as a reference. Furthermore the start and stop of the auxiliary blowers are controlled according to the scavenge air pressure.

The control of the auxiliary equipment on the engine is normally divided among the ACUs so that, in the event of a failure of one unit, there is sufficientredundancy to permit continuous operation of the engine.

MOP

The Main Operating Panel (MOP) is the main information interface for the engineer operating the engine. The MOP communicates with the controllers of the ECS over the Control Network. However, the running of the engine is not dependant on the MOP, as all the commands from the local control stations are communicated directly to the EICU's/ECS.

The MOP is located in the engine control room. It is a PC with a touch screen as well as a trackball from where the engineer can carry out engine commands, adjust the engine parameters, select the running modes, and observe the status of the control system. A back-up MOP is also placed in the engine control room (*see Section 703-09 for detailed MOP-description*).

Control Stations

During normal operation the engine can be controlled from either the bridge, the engine control room or the Local Operation Panel (LOP).

The LOP control is to be considered as a substitute for the previous Engine Side-Control console mounted directly onto the MC-engine.

The LOP is as standard placed on the engine.

From the LOP, the basic functions are available, such as starting, engine speed control, stopping, reversing, and the most important engine data are displayed.

To start and run the engine from the LOP, some conditions have to be fulfilled. Next to the LOP, a nameplate (containing the text, highlighted below) is placed. The name plate comprises the conditions that have to be fulfilled before start.

Main Engine Start from Local Operating Panel

In order to start/stop and operate the main engine from the Local Operation Panel (LOP), Localcontrol must be selected as the active control station. This is normally done via the request / acknowledge facility of the Remote Control System. However, it is possible to override the normal change-over procedure by means of the 'Forced Take Command' push button. Activating this button will force the control to the local control station.

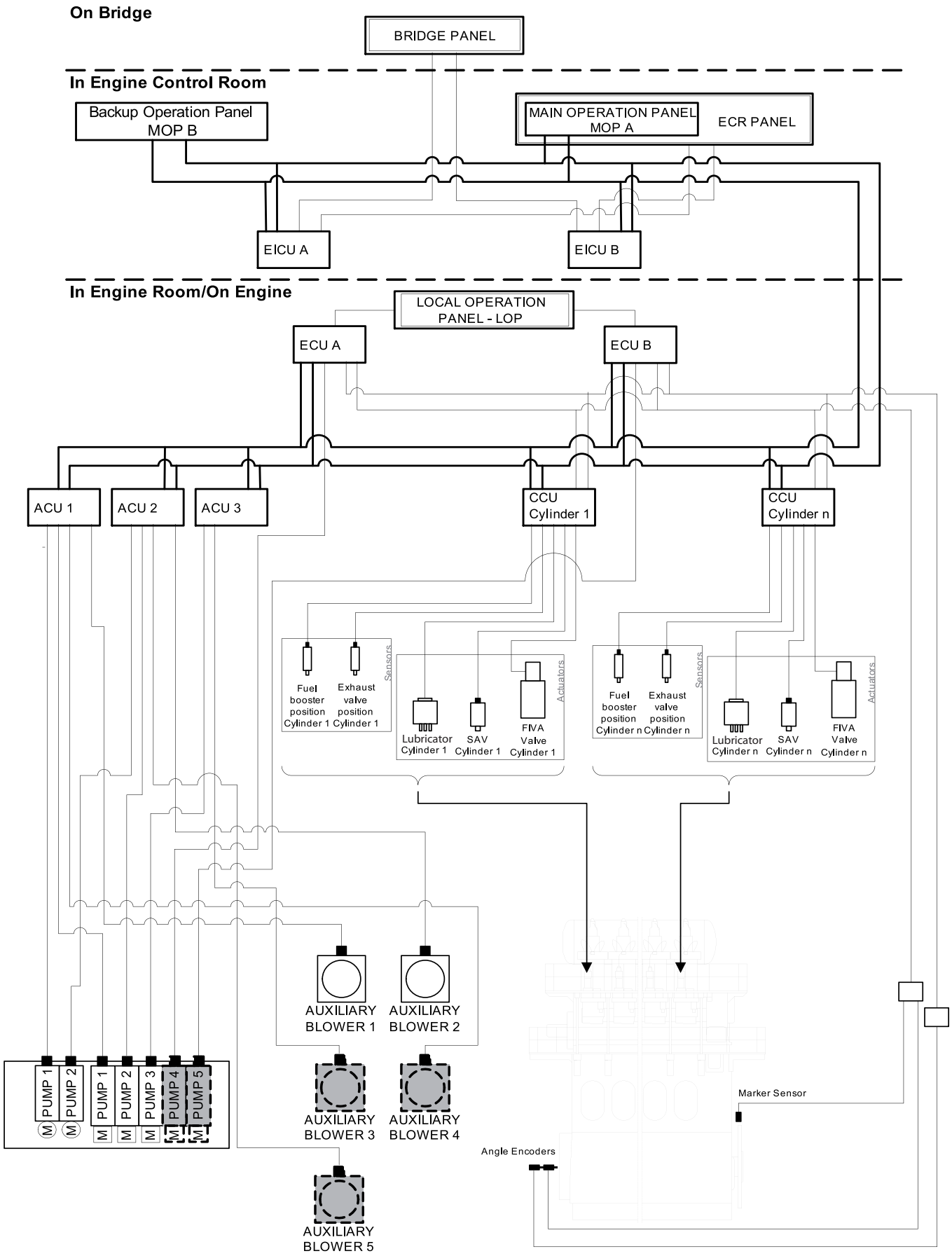
Before start, the hydraulic oil pressure must be higher than 150 or 205 bar, depending of the hydraulic system is at 200 or 300 bar. After shut down, the pressure has to be rebuild which may take 60 - 120 seconds.

To stop the engine: Activate STOP
(and reset shut down)

To start the engine: Change from STOP to START

If the auxiliary blowers are running, the Engine Control System will start the main engine automatically without delay.

If the auxiliary blowers are stopped, the Engine Control System delays the start until the auxiliary blowers are started and running. Then, the Engine Control System will start the main engine automatically.


On Bridge
BRIDGE PANEL
In Engine Control Room
Backup Operation Panel
MOP B
MAIN OPERATION PANEL
MOP A
ECR PANEL
EICU A
EICU B
In Engine Room/On Engine
LOCAL OPERATION
PANEL - LOP
ECU A
ECU B
ACU 1
ACU 2
ACU 3
CCU
Cylinder 1
CCU
Cylinder n
Fuel
booster
position
Cylinder 1
Exhaust
valve
position
Cylinder 1
Sensors
Lubricator
Cylinder 1
SAV
Cylinder 1
FIVA
Valve
Cylinder 1
Actuators
Fuel
booster
position
Cylinder n
Exhaust
valve
position
Cylinder n
Sensors
Lubricator
Cylinder n
SAV
Cylinder n
FIVA
Valve
Cylinder n
Actuators
PUMP 1
PUMP 2
PUMP 1
PUMP 2
PUMP 3
PUMP 4
PUMP 5
M
AUXILIARY
BLOWER 1
AUXILIARY
BLOWER 2
AUXILIARY
BLOWER 3
AUXILIARY
BLOWER 4
AUXILIARY
BLOWER 5
Marker Sensor
Angle Encoders

1. Main Operation Panel (MOP) (Overview)

The MOP is the Human Machine Interface (HMI), through which the Engine Control System (ECS) and thus the ME engine is operated. The HMI is described in sections 703-14 through 703-18.

The MOP is basically a marine approved and certified PC with 24DC supply and touch screen.

An actual installation comprises of two MOPs where both are placed in the engine control room (ECR). Typically MOP A is placed in a console opposite the manoeuvring handle (the normal operation position) and MOP B on a desk. The two MOPs are operationally fully redundant to each other. Though some of the more advanced troubleshooting facilities are only available on MOP B. Normally only MOP B has a keyboard connected.

1.2.7 Creating Screen Dumps

Creating screen dumps can be carried out on a MOP with an attached keyboard. To create a screen dump go to the screen in question and, press the [Prt Scr] button on the keyboard to capture the screen.
Press Crtl + Esc to gain access to the windows menu and open a program like Wordpad or Paint and press Paste to copy the screen dump into the program.

1.1 Description

MOP A has no keyboard or mouse. Both may optionally be equipped; a trackball typically replaces the mouse.

A keyboard is essentially not required during normal engine operation and a virtual keyboard is displayed in case textual input (e.g. password) is needed.

Instead of traditional use of a mouse, the operator touches the graphic elements on the screen in order to interact with the ECS.

1.2 Service kit

The MOP comes with a service kit. The kit comprises of a CD-ROM drive (if not build-in), a keyboard and a CD with the operating system, and is setup specifically for this PC type.

1.3 Issues to both MOP type

1.3.1 Ethernet connections

Only MOP B may be connected with an Ethernet connection to other systems such as CoCoS-EDS. Special care must be taken when connecting to networks of any kind to avoid virus and worms on the MOP. Connection to other systems is illustrated on plate 70319 fig 1.

1.3.2 Unauthorised software

DISCLAIMER: MAN Diesel disclaim responsibility for any event or condition that originates from installation of unauthorised software. This includes, but is not limited to, virus.

To emphasize the disclamer, yellow stickers are placed at suitable places on the MOPs.

If it is necessary to extract data from a MOP, it is recommended to use the in-build CD-Rom burner, instead of a USB-stick.

1.3.3 Control Network

Each MOP is connected to the ECS by means of the Control Network that interconnects the nodes in the ECS. Control Network is implemented as two independent networks for redundancy as shown on Plate 70332.

1.3.4 Maintenance

Normal PC maintenance tools and cleaning detergents apply.

1.4 Software Scope of Supply

There are three different types of software supplied with the ECS:

1.4.1 Operating System

1.4.2 Engine Control System

1.4.3 Service Parameters

This software is either stored on a set of CD-ROMs or on a pair of USB sticks. In either case it is important that the software is stored in a proper place where it is accessible and can be found on request. The recommended storage place is together with the engine manual.

In case the software is stored on USB sticks these might be equipped with a

Read/Write selector. This switch should normally always be set to Read.

In addition to the above there will also be the following two types of software as a part of the software supply:

1.4.5 CoCoS EDS

1.4.6 PMI software

These last two types of software are not to be installed on the MOPs, but instead on a separate PC (see plate 70319 fig. 1). However having these programs running correctly is essential to achieving optimal performance of the engine and ECS. Both of these programs include user manuals and instructions together with their installation.

1.4.1 Operating System

The Operating System is the software that is used for the MOPs. This is an embedded version of Windows XP. This is normally preinstalled by the MOP supplier and delivered together with the MOP hardware.

1.4.2 Engine Control System

The Engine Control System is a set of applications installed on the MOPs that enable them to perform their main function, i.e. it turns them into the MOPs.

A very important aspect of the Engine Control System is the version (e.g. “1008-4.1” or “0905-8.2”). It is critical that the version of the software stored on USB/CD-ROMs is the same version that is currently installed. The currently installed version can be seen on the Version Screen on the MOPs (this screen is described in more detail in section 703-18).

NOTE

Always ensure the version of the installed ECS matches the version of ECS stored onboard.

1.4.3 Service Parameters

The Service Parameters software functions of a backup in case of major system failure. Normally it should not be used as the MOPs automatically store backup versions of the parameters from the MPCs.

1.4.4 Use Cases for Software

The two normal use cases for the software stored onboard are:

A. The replacement of a MOP (by crew)

B. Service visit including update of parameters and/or ECS version

For case A (a new MOP) the Operating System will normally be preinstalled, so when the MOP powers up it will seem identical to a standard Windows PC. The task is then to install the Engine Control System.

This is done by inserting the software medium (USB or CD-ROM) into the PC and then locating the correct install script. There will normally be two options: “install_mopA_XPE.bat” and “install_mopB_XPE.bat”. These are both placed on the same CD-ROM/USB. It is important to select the script matching the MOP being installed.

After successful completion of the installation (follow the on-screen instructions) the MOP main application can be started using the “Start MOP” option in the Windows Start menu.

After starting this application the MOP will automatically acquire configuration information and parameter backups from the MPCs.

For case B (service visit where parameters and/or ECS version is changed) it is important that the visiting service engineer ensures that the ECS version and service parameters stored onboard are still correct. This either means supplying a new set of CD-ROMs or updating the data on the USB stick (momentarily changing the Read/Write selector to Write).

1.4.5 CoCoS EDS

This software is used for the data logging program that is collecting data from the ECS. It is to be installed on the same PC that is running the PMI software.

Always ensure that this software is running correctly since this will greatly enhance the options regarding troubleshooting and faultfinding available.

Since the CoCoS EDS interfaces to the ECS for data logging it is important to ensure that the versions are compatible. For instance in case of an update of the ECS, make sure that CoCoS EDS is also updated.

The program DatGat is included with the CoCoS EDS software. This program is a valuable tool for extracting data from the ECS for use during troubleshooting. Instructions on how to use DatGat is included with the installation.

1.4.6 PMI Software

The PMI software comes in one of two versions: As minimum an offline version is delivered with the ECS. Alternatively the engine may be equipped with PMI Auto-tuning. In either case the PMI system is a valuable tool for performance measurements and as a basic for engine adjustments.

Fig. 1

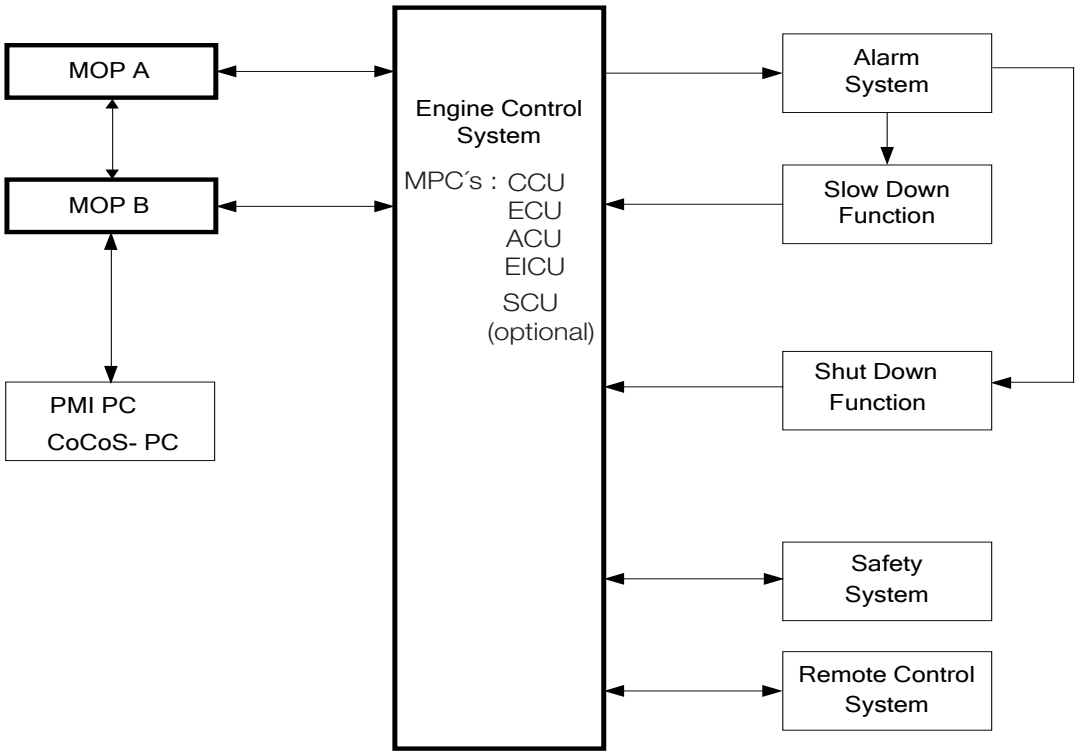
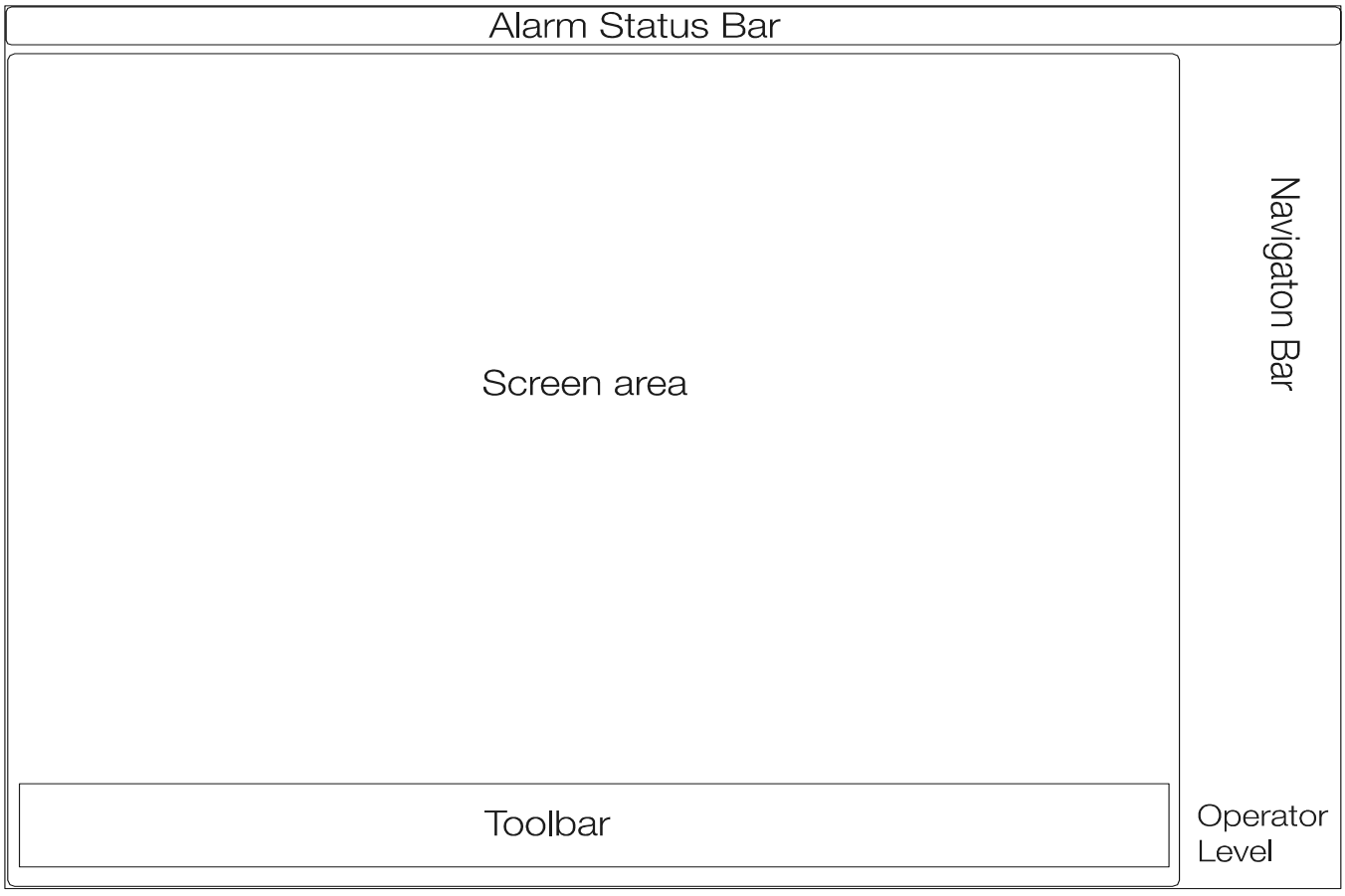

MOP A
MOP B
PMI PC
CoCoS- PC
Engine Control System
MPC´s : CCU
ECU
ACU
EICU
SCU
(optional)
Alarm System
Slow Down Function
Shut Down Function
Safety System
Remote Control System

Fig. 2


Alarm Status Bar
Screen area
Navigaton Bar
Toolbar
Operator Level

1. HMI (Human Machine Interface)

The HMI consists of four fixed areas always shown. See Plate 70319 Fig. 2 page 15.

1. An Alarm Status Bar showing the oldest non-Acknowledged alarm and Alarm status at the top of the screen.

2. A Navigation Bar at the right side of the screen.

3. A Toolbar at the bottom of the screen.

4. A Screen area (rest of the Screen)

The HMI operates with two password levels, which are Operator level and Chief level.

Operator level:
From the Operator level is it not possible to set any parameters.
It is for normal operation and monitoring only.

Chief level:
In addition to the Operator level, this user level has privileges to set parameters (setpoints,engine states and engine modes). A password must be supplied in order to access Chief level.

There is no limit in the number of unsuccessful attempts to enter the correct password. The password is hard coded in the system and can therefore not be changed.

2. Alarm System

The alarms on the MOP panel are all related to the Engine Control System.

On plate 70319 fig. 1 is shown the ECS and the possibilities to communicate with the ordinary alarm system, and the safety system. These three systems are able to interact with each other i.e. in case of a slow down and a shut down.

The shut down and slow down can be divided into two kinds – cancellable and non-cancellable.

If a cancellable shut or slow down occur the safety system will release an alarm prewarning and after timeout of the prewarning periode activate the shut/slow down.

If a non-cancellable shut or slow down occur the safety system must release the shut or slow down immediately.

3. Alarm Handling

Alarm handling is carried out from one of the following four screens

1.1 Alarm List

1.2 Event Log

1.3 Manual Cut-Out List

1.4 Channel List

These four Alarm Handling screens can be accessed via the secondary navigator by pressing the “Alarms” button in the main navigator. When pressing this button, the latest selected alarm screen will be shown on the screen. If no screen has previously been selected, the “Alarm List” is shown. The screen can then be changed via the secondary navigator.

3.1 Alarm List (See Plate 70320)

The Alarm List contains the central facility of the Alarm Handling, allowing for display, acknowledgement and cut-out of raised alarms. Detailed alarm explanation can be accessed for each of the alarm occurrences.

The alarms are displayed in chronological order, with the latest alarm at the top.

The Alarms might be grouped by the ECS if they are related to the same cause in order to simplify the overview of the alarm list. The group can be expanded by selecting a group and pressing the -/+ button on the toolbar. Not all alarms are grouped.

If there are too many alarms to be displayed at the same time on the screen, the remaining alarms can be accessed by pressing the Page-up/Page-down buttons on the Toolbar.

Alarms presented in the alarmlist can be found in three states:

1. Alarm non acknowledged

2. Alarm acknowledged

3. Normal non acknowledged

An alarm can only appear as one line in the alarm list. An acknowledged alarm going into normal or an alarm in the normal state being acknowledged, is immediately removed from the list.

Acknowledgement of a single alarm or all alarms is allowed on both levels

(operator or chief) from the “Ack“/“All” buttons on the toolbar at the bottom of the screen. (When pressing “Ack“/“All” only the alarms visible on the screen are acknowledged).

To see a detailed alarm explanation, press the relevant alarm line.
The alarm line is then surrounded by a thick blue line showing that it has been selected. By pressing the button “Info” on the Toolbar, a window will appear just above the Toolbar. This window contains:

- Description
- Cause
- Effect
- Action

So the engineer is able to start troubleshooting on this particular alarm (The detailed alarm explanation is removed by pressing the same “Info” button).

3.1.1 Alarm Line Fields, Colours and Symbols (See Plate 70320)

Each alarm line is divided into the following fields:

Ack. The acknowledgement status field of non-acknowledged alarms contains an icon toggling between two states, alerting the operator of a non-acknowledged alarm.

The status of the alarm can also be identified by the background colour as well as the graphical identification in the Acknowledgement field on the Screen as shown below.

	Non-Acknowledged alarm in alarm state
	Non-Acknowledged alarm in normal state
	Transition from Non-acknowledge to acknowledge of an alarm in alarm state
	Acknowledged alarm in alarm state
	Unacknowledged alarm is cut out
	Alarm was previously unacknowledged in normal state. Now the state is not available
	Alarm was previously unacknowledged in alarm state. Now the state is not available
	Transition from Non-acknowledge to acknowledge of an alarm in normal state
	Alarm is acknowledged in normal state, and in the process of being removed from the alarmlist

At the upper right corner of the screen four small icons are shown which are (from left to right):

	Number of non-acknowledged alarms
	Number of active alarms
	Number of Manual Cut-out alarms
	Number of invalidated channels

From the toolbar at the bottom of the Alarm List screen, alarms can be cut-out. This feature is described in details in Section 3.3.

Description. This field contains the alarm text (e.g. »HCU oil leakage«)

Status. This field shows the status of the alarm as one of the following:

- Normal
- Alarm
- Low
- High
- Not available
- Auto cut-out
- Manual cut-out

ID. This field contains a unique alarm identity. (e.g. ECUA_010112). This ID must always be used for reference and reporting.

Time. This field shows the time of the first occurrence of the alarm, no matter the status changes. The time is shown in hours, minutes, seconds and 1/100 sec. (e.g.13:47:02.56)

3.2 Event Log (See Plate 70321)

The event log can be used for viewing the history of events and to support the operator in troubleshooting. Events stay in the log even after they have been acknowledged and are no longer active. Alarms are logged with three events in the Event Log. The events are Alarm, Normal and Acknowledged. There can be up to 1 million events logged in the event log.

The events are stored in a database on the MOP's hard disc with both local and UTC time stamps. If more than 1 million events are logged, the oldest events are

discarded.

Each event (with the most recent event on top) is shown as a single line and each event line is divided into the following fields:

ID Unit Tag. This field contains a unique event identity.

Date. This field contains the date of the event.

Time. This field shows the time of the event. The time is shown in hours, minutes, seconds and 1/100 sec.

Description. This field contains the alarm text (e.g. »HCU oil leakage«).

Status. This field shows either Normal or Alarm.

MCo. Shows whether the alarm is Manual Cut-Out or not.

ACo. Automatic Cut-Out.

Ack. The alarm is acknowledged.

3.2.1 Searching for an event from a specific date and time or by tag number.

This feature can be helpful when extracting information to external parties or when investigating an event.

When scrolling up or down on the Event Log screen is not sufficient, it is possible to search for a specific event by tag number by pressing the button “Unit/Tag Filter”. When an alarm occurs, it is given a tag number that is stored together with the alarm event. By writing this number in the dialog box and pressing “Apply” the alarm event is shown on the screen.

Similarly, the button “Time Span Filter” sorting can be selected.

Enter the from/to date and time in the toolbar by using the popped up keyboard. Press “Apply” to execute. Note that the entered time has to be in UTC time. As a result the events, inside the selected timespan to the specified date and time, will be selected and shown on the screen.

From the button “Go to Time/Date”, events which took place at/on a specific time/date can be displayed. Note that the entered time has to be in UTC time.

When a filter is no longer needed, remember to remove it (by pressing the button again), otherwise it might seem like the event log is frozen and does not receive new events.

3.2.2 Exporting the eventlog.

From the toolbar “Export Event Log”, displayed when the “Export” button is pressed, it is possible to print a copy of the Event Log or make a back-up Dump used for information to external parties or the engine crew themselves.

Should external parties ask for an Event Log record (for trouble shooting purposes), the Event Log record can be saved on a USB memory stick (or Hard Disc Drive if no USB memory stick is available) as a zip file. Be aware of the risk of using USB-sticks generally.

The file name will be: **EventLog<DateTime>.zip** when the file is **saved** on a USB-memory stick.

(Is the Event Log **dumped** to a USB memory stick (or Hard disc Drive) the file name will be: **EventLogDump<DateTime>.zip**).

In both cases the **DateTime** is the UTC time when the file was saved.

The USB memory stick (containing the zip file) can then be handcarried to the ships mail PC and the zip file mailed to external parties for evaluation.

3.3 Manual Cut-Out List (See Plate 70322)

Manual Cut-Out of alarms may be used, for instance, if the engineer has observed a failure of a sensor that is not detected automatically (see below) or if, for instance, a Tacho pick-up is failing (the engine running on the redundant Tacho system) and is continuously giving an alarm and cannot be replaced immediately.

Alarms are sometimes cutted-out automatically. Automatic cut-out may be used by the system to suppress alarms which are unimportant in specific states, e.g. when a sensor is invalidated by the operator.

The manually cut-out alarms are shown in a separate list, which can be accessed from the navigation bar. The manual cut-out screen is in functionality equivalent to the channel list screen. An alarm can be cut-out manually from the screens Alarm List, Manual cut-out List or Channel list.

All alarm channels that have the status “Manual cut-out” are shown in the manual cut-out screen.

Removing (“Re-activating”) an entry from the Manual cut-out list is done by highlighting the alarm(s) involved on the screen and thereafter pressing the button “Reactivate” in the toolbar.

3.4 Channel List (See Plate 70323)

The channel list screen contains status information of all alarm channels within the ECS, no matter the status of the individual alarm channel. As default, the alarm channels are listed in tag-name alphabetic order. From the channel list screen, it is possible to cut out (and re-activate) alarm channels.

1. Engine

Engine operation and adjustment is carried out from one of the following five screens, some of which are divided further into subscreens :

1.1 Operation

1.2 Status

1.3 Process Information

1.4 Process Adjustment

1.5 Chief Limiters

Screens 1.1, 1.2 and 1.3 are related to engine start-up preparations and daily running, 1.4 and 1.5 are related to engine adjustments.

The operator can access these five operation and adjustment screens via the secondary navigator by pressing the Engine button in the main navigator.

On the screen, the displays which can be activated (i.e. pushed like a button) are shown in 3-D graphic and the inactive displays are in 2-D graphic. Once activated, the display is highlighted with a blue line at the outer circumference

1.1 Operation (See Plate 70324)

Operation is the main screen for control of the engine during voyage.

On this screen, “prepare start” can be performed and “slow turn” can be enabled before start of the engine.

Plate 70324 shows the full screen. In the following, a detailed description of the individual fields will be given.

1.1.1 Main State

The main state field contains 3 status fields indicating the current sub-telegraph command states and the states of the engine.

The background colours on the graphics are specified as:

- Blue = Normal state
- Yellow = Warning state
- Red = Alarm state
- Grey/dimmed = Not in use.

The top field indicates the current sub-telegraph command state, which can be one of the following:

- FWE (Finished With Engine)
- Standby
- At Sea

The middle field indicates the states of the engine:

- (Blank)

  (engine is correctly operative or blocked according to the sub-telegraph command)
- Engine not blocked (with yellow background): if top field is FWE, and not all conditions are fulfilled.
- Engine not ready (with yellow background): if top field is Standby or At Sea, and not all conditions are fulfilled.

The cause of the states “Engine not blocked” or “Engine not ready” can be seen in the Status screen, Plate 70325, in the field Start Conditions.

The bottom field indicates, with yellow or red warnings, the following four states :

- (Blank) (engine is ready and increased limiter inactive)
- Increased limiter (yellow) is shown when active, (and engine status is not FWE, and neither Start Blocked or Shut down status is active). Increased limiter is a warning condition.
- Start Blocked (red) is shown when active, (and engine status is not FWE, and Shut down status is not active). Start Blocked is an alarm condition.
- Shut down (red) is shown when active. Shut down is an alarm condition.

1.1.2 Command [RPM]

The command indicator button contains six or eight status fields. Two fields highlighted, indicating the current active control station (Bridge, ECR or LOP) and the actual speed command setting for each of the control stations. The actual selected control station is indicated by dark blue (normal selection) or yellow (take command) see below.

The Bridge Control and ECR stations are parts of the RCS (Remote Control System). Only one control station at a time is active.

The active control station is normally selected via the RCS request acknowledge-system. However, the selection may be overridden from either the ECR or LOP by the “take command” buttons, which are wired directly to the ECS (Engine Control System) and situated on the control station panels.

If the active control station selection is inconsistent, the ECS keeps the last valid active control station as the active station, until a new valid selection is available

(possibly a “take command”).

In the event the “take command” signals from both the ECR and the LOP are selected simultaneously, the LOP has first priority and is selected.

1.1.3 RPM Fine Adjust

By pressing the Command [RPM] button, a RPM Fine Adjust toolbar is displayed. It allows the RPM setpoint to be adjusted in operator level. E.g. if the speed command setpoint is 83.8 RPM, it can be fine adjusted to 84 RPM. Moving the handle will disable the fine adjustment mode.

NOTE *RPM fine adjustment can only be performed in ECR Command mode.*

1.1.4 Running Mode and Governor Mode

The engine running mode and governor mode buttons each contains a status field indicating the current active running and governor modes.

Changing the running mode is done by pressing the running mode button. This brings up a toolbar. On the toolbar, the current running mode is selected.

The running modes are typically *Economy* and *Emission*. However, additional modes (*TC Cut Out* and *Custom*) may be available. If only Economy mode is available, the mode selection is not usable (dimmed).

The governor mode can be either RPM Control, Torque Control or Index Control.

Changing governor mode is done similar to changing running mode.

1.1.5 Governor Mode

The speed controller can be requested to calculate the fuel index according to various methods.

Each method is referred to as a ‘Governor Mode’, and they represent various tolerances for maintaining the engine speed equal to the set point during load and/or set point variations.

For normal operation the following two modes are available:

- **RPM control:**
  ‘Speed’ mode - provides the most rigid speed control, leading to large fuel index variations.

- **Torque control:**
  ‘Torque’ mode – the speed control is dampened when the speed is close to the required speed, providing speed control without large index varia-

tions, but allowing larger speed variations.

A third mode exists for test purposes:

- **Index control:**
  'Fixed Fuel Index' Mode – A test mode where the index is kept constant as long as the speed is within a preset range. Only if the speed drifts outside this range, will the speed controller become active and regulate the index.

1.1.6 Pressure Indicators

The pressure indicators consist of a bar graph and a status field.

Both the bar graph and the status field indicate the pressure of the medium.

1.1.7 Auxiliary System Status Indicators

The system status indicators display information of the operation mode of the auxiliary systems controlled by the ME ECS. These are all indicators and do not allow changing mode or status. Possible control is made on the screens for the actual systems. Indicators are:

- HPS (Hydraulic Power Supply): Manual, Auto
- Lubricator: Running Stopped, Prelube, LCD (Load Change Dependent) On
- PTO (Power Take Out): Off, Allowed Request, Request (with yellow and warning if a parameter for switching on the PTO is not fulfilled) and Permission.
  Optional, only if the engine has PTO.
- Auxiliary Blowers represented by two status fields, one indicates the operation mode, which can be Auto or Manual. The other indicates the current status of the blowers, which can be Stopped, Starting, Running or Failed.
- Var.XBP (Variable Exhaust Gas Bypass): percentage open.
  Optional, only if XBP is installed.
- On/Off XBP (Exhaust Gas Bypass): Open or Closed.
  Optional, only if XBP is installed.
- VT (See separate manual for Variable Turbocharging System)

  Optional, only if VT is installed.

- WHR (Waste Heat Recovery) : Off, Allowed, Request, Request (with yellow and warning) and Permission. The WHR Is ready for use when »Allowed« is shown(see Plate 70324).

  Optional, only if WHR is installed

1.1.8 Start Status Indicator

The start status indicator consists of a single display, showing information on the status of a start attempt.

The status shown can be one of the following:

· Stopped

· Running

· Repeated Start (yellow)

· Slow Turn Failed (red)

· Start Failed (red)

1.1.9 Speed [RPM]

The speed indicator consists of a bar graph.

The set point and the actual running speed of the engine are shown in the two displays above the graph.

The uppermost display is the speed command modifier. The speed modifier is a function that may override the actual speed command and control the speed system set point for the engine speed. When the function is active, the control mode is shown in the Speed Indicator.

The available modifiers are:

Stabilizing	The stabilizing modifier defines a speed set point that ensures the starting of the engine.
Stop	The stopped modifier sets the speed set point to zero.
Minimum Speed	The minimum speed command modifier defines a minimum speed set point during operation of the engine.
Maximum Speed	The maximum speed command modifier defines a maximum speed set point during operation of the engine.
Fixed Speed Set	Fixed speed set is activated when running in pitch backup mode from bridge (option for CPP systems).
Shut Down	The shut down modifier sets the speed set point to zero.
Slow Down	The slow down modifier sets the speed set point to a predetermined slow down level.
PTO	The speed is kept higher than ordered to keep the shaft generator connected during start up of the auxiliary engines.
Speed Ramp	Increase of speed is limited by the ramp.
Load Program	The load control makes it possible to load the engine gradually during a predefined time period.
Barred Speed *) range	Indicates that the modifier has changed the pre-set from inside a barred range to either above or below barred range limit. The engine may have 0-2 barred speed range(s).
RPM Fine Adjust	The speed is being modified according to the setting entered in the RPM Fine Adjustment tool-bar on the Operation Screen.
Run Up/Down Prog.	When the chief increases or decreases the speed set significantly, the engine speed follows prede-fined curves. Optional.
Chief Max Speed	If the user is at Chief level, it is possible to define a Maximum Engine Speed on the Chief Limiter screen. See section 1.5.
TC Cut Out	If the TC Cut Out option is installed, the speed will be limited, when the engine is running in TC Cut Out Mode.
WHR	The speed is kept higher than ordered to keep the shaft generator connected during start up of the auxiliary engines.

* Barred Speed Range

If the function is used, the barred speed range(s) is marked on the side of the bar graph. Most engines have two barred ranges and the ranges are identical in the ahead and astern directions (FPP systems). When operating from ECR and Bridge, the speed set is automatically kept outside these range(s).

1.1.10 Pitch Indicator

The pitch indicator is only shown on ships with CPP systems.(see Plate 70324 page 5(5))

The pitch indicator consists of a label and a bar graph, indicating the current pitch setting. The label uses + (plus) or – (minus) to indicate positive (forward) or negative (backwards) pitch. The bar graph is centred at 0 and positive and negative is up and down, respectively.

The pitch indicator bar graph uses a pointed graph to underline the direction (sign) of the current pitch.

1.1.11 Fuel Index Indicator [%]

The fuel index indicator consists of a bar graph and a set of status fields.
The top status field indicates the current effective or nearest limiter.
The electronic governor will limit the fuel index command according to the actual engine operating conditions. If no limiter is currently active the nearest limiter is displayed on a light blue background. When a limiter is active it is displayed on a dark blue background.

Available limiters are:

Start	The start limiter defines a fixed amount of fuel to be used for the first injections during start.
Chief	The chief limiter defines a maximum amount of fuel to be injected according to the settings done by the operator at the screen Chief Limiters.
Scavenge Air Pressure	The scavenge air pressure limiter defines a maximum amount of fuel to be injected based on the actual scavenge air pressure, in order not to overfuel the engine.
Torque	The torque limiter defines a maximum amount of fuel to be injected according to actual engine speed. This is to ensure that the engine torque does not exceed recommended levels.
Hydraulic Power Supply	The hydraulic power supply pressure limiter defines a maximum amount of fuel oil to be injected according to actual hydraulic power supply requirements, in order to ensure that the hydraulic pressure does not drop below a minimum operation limit.
TC Cut Out	If the TC Cut Out option is installed, the fuel index will be limited, when the engine is running in TC Cut Out Mode

Below the limiter status field is a set of dynamic labels displaying the actual fuel index and the current fuel index limit.

1.1.12 Prepare Start Button

The prepare start function is normally to be activated before start if the engine has been stopped for some time. Pressing the button will start the cylinder pre-lubrication and the auxiliary blowers (if stopped).

When pressed, the button will stay down until the procedure is completed.
If the engine has not been started within a certain time, the auxiliary blowers will automatically stop.

The command is available only when the engine is stopped and the prepare start-procedure is not running.

1.1.13 Slow Turn Button

Manual slow turn is used during preparations before start of the engine, and is normally to be used with the indicator cooks open. Slow turn is used for visual inspection of the blow out. When the button is selected, the engine is operated on starting air through the slow turn valve as long as the control handle is activated. If a manual prepared start has not been executed, the system will automatically perform one.

1.1.14 Auto Button

The auto button is pressed when start preparations are completed, and the engine has to be started. When selected the engine will perform a normal automatic start.
If a manual prepared start has not been executed, the system will automatically perform one.

1.1.15 Air Run Button

The air run button function is only available in Chief level.

The air run button can be used in the following situations:

When checking the Tacho system (test), starting air valve test and after maintenance (and after check with the turning gear) to check the function and movement.

Air run function is similar to the slow turning, except that the main starting valve is open and the engine is running faster (still without fuel injection).

Slow Turn and Air Run are activated when the handle is in “run” position. This will rotate the engine until the handle is set to »stop« (or the engine is started by pressing the Auto button).

1.2 Status (See Plate 70325)

The engine status screen provides extended engine information specifically for use when changing the status of the engine, i.e. in the process from FWE to standby state or vice versa.

1.2.1 Main State Field

The main state field shows exactly the same information as the main state field in the operation screen view, Plate 70324. For detailed explanation, see 1.1.1 Main State Field, page 1 in this chapter.

1.2.2 Start Conditions

The Start Conditions field is a status list, showing if the engine is in the intended state (FWE or st.by/at sea). The conditions shown in bold must be fullfilled before the intended state can be obtained.

If a condition is shown with a green check mark, the condition is in accordance with the intended state.

If a condition is shown with a red background and a white exclamation mark the engine is not ready for starting.

If the condition is not relevant the background is dimmed, but a check mark or exclamation mark will still indicate the status of the condition.

The possible status indications of each field are listed below:

- Main Starting Valve in service position (Standby or At Sea)
  Yellow, when main starting valve is not in service position.
  Green, when main starting valve is in service position.
- Main Starting Valve Blocked (FWE)
  Yellow, when main starting valve is not blocked.
  Green, when main starting valve is blocked.
- Starting Air Distribution System in service (Standby or At Sea)
  Red, when Starting Air Distribution system is blocked.
  Yellow, when Starting Air Distribution system is not in service.
  Green, when Starting Air Distribution system is in service.
- Starting Air Distribution System blocked (FWE)
  Yellow, when Start Air Distribution system is not blocked.
  Green, when Start Air Distribution system is blocked.
- Starting Air Pressure (Standby or At Sea)
  Red, when starting air pressure is below level for bridge start.
  Green, when OK.
- Control Air Pressure (Standby or At Sea)
  Red, when control air is vented.
  Yellow, when control air pressure is low.
  Green, when control air pressure is OK.
- Control Air vented (FWE)
  Yellow, when control air is not vented.
  Green, when control air is vented.
- Turning Gear disengaged (Standby or At Sea)
  Red, when turning gear is not disengaged.
  Green, when turning gear is disengaged.
- Auxiliary Blowers (Standby or At Sea)
  Red, when blowers are not operational.
  Green, when blowers are operational.

- Hydraulic Power Supply (Standby or At Sea) (Start-up pumps)
  Yellow, when HPS is not OK. (e.g. in manual mode)
  Green, when HPS is OK.
- Hydraulic Pressure (Standby or At Sea)
  Red, if pressure is too low.
  Green, if pressure is OK.
- Zero Pitch before starting (Standby or At Sea) (CPP systems only)
  Red, if pitch is not zero before starting.
  Green, if pitch is zero before starting.

1.2.3 Start Air

The starting air pressure indicator displays the system starting air pressure continuously.

1.2.4 Turning Gear

The field shows either Engaged or Disengaged.

1.2.5 Control Air Pressure

The control air pressure indicator displays the system control air pressure continuously.

1.2.6 Blowers

Shows the status of the auxiliary blowers, which is either:

- Stopped
- Running
- Starting
- Failed

1.2.7 Hydraulic Oil

The hydraulic oil pressure indicator displays the system hydraulic oil pressure continuously.

1.2.8 Crankshaft

Shows the current position of the crankshaft when turning the engine (for maintenance purposes) with the turning gear, and allows checking of the position in case of malfunction of starting air valves.

1.2.9 Pitch Start Blocking Indicator (CPP systems only)

On the pitch start blocking indicator, it is possible to cancel the start blocking. (This could be relevant if the engine is stopped with the pitch in ahead or astern position, and return to zero is not possible due to some failure).

Cancel of start blocking can only be performed from Chief Level. When blocking is cancelled this is shown with the text “Blocking Cancelled” on a red background.

1.2.10 Start Status Indicator

The start status indicator consists of a single field containing information on the current start status.
Three successive start attempt failures or a slow turn failure will cause Start – Blocked. The below conditions are indicated in the start status indicator:

- Stopped
- Running
- Repeated Start (warning)
- Slow Turn Failed (alarm)
- Start Failed (alarm)

1.2.11 Details

Pressing this button will display the individual readings of the Start Air, Control Air and Crank Shaft sensors.

1.2.12 Pneumatic Diagram

In addition to the information described above the screen contains a simplified diagram of the pneumatic starting and control air system. The diagram is intended to indicate the functionality of the system. For a specific engine, further details can be found in the plant installation drawings supplied by the engine builder.

The pilot valves A, B and Slow Turning, can and must be activated to test that the main starting valve and the slow turning valve open and the tightness of the starting air valves in the cylinders. (This test is to be performed regularly with stopped engine, see Chapter 702-01 in the operation manual).

Pressing the field, encircling the pilot valves, opens a tool bar from which activation of the pilot valves is possible.

1.3 Process Information (See Plate 70326)

This screen gives the user a quick overview of the possible limiters/governors used. The screen always shows the values currently in use.

It is important to realise that the values on a light blue background (e.g. Pcomp/Pscav ratio or Estimated Engine Load) are set points or estimates, whereas those on a dark blue background (e.g. Speed Actual or Hyd. Oil Actual) are actual measurements. Due to the inherent difficulties of estimating process values there will often be some deviations between the set points and the values that can be measured using e.g. PMI equipment.

1.3.1 Running Mode

This field is the same as described in 1.1.4 Running Mode and Governor Mode Field.

An engine running mode is based on an algorithm which continuously determines the fuel injection and exhaust parameters that influence the cylinder process. By controlling the cylinder process (maximum cylinder pressure, compression ratio and blow back), fuel efficiency and emissions can be controlled to a certain extent.

For the ME engine, several running modes may exist. These contain different algorithms, and provide various fuel efficiency and emission characteristics. The running modes are commissioned during test bed running.

1.3.2 Speed Control

This field is the same list of speed modifiers described in Section 1.1.9 Speed Indicator.

The Index Limiter field is the same list of index limiters described in Section 1.1.11 Fuel Index Indicator.

1.4 Process Adjustment (See Plate 70327)

ECS offers two methods for adjustment of the combustion process:

- Auto Tuning for easy tuning of the cylinder pressures for best engine performance

- Manual adjustment of process offsets for cylinder pressures and FO quality

Auto-tuning is described in section 1.4.1. For detailed information and use of auto-tuning is referred to the “PMI Auto-tuning, Operation, User’s Reference Guide”, included in the PMI installation.

NOTE

Auto-tuning functions are available only for engines for which the PMI Auto-tuning option has been selected.

Manual adjustment of process offsets is described in section 1.4.2 and is intended for engines equipped with PMI Offline or for adjusting cylinder pressures during operating conditions that do not allow for auto-tuning.

1.4.1 Auto Tuning (optional)

Auto-tuning reduces the workload required for operating the engine continuously at the design conditions, according to the actual running mode and engine load ordered by ME-ECS. Auto-tuning covers adjustment of maximum, compression and mean indicated pressures and is made available as “*continuous auto-tuning*” (fully automatic) and as “*user-controlled auto-tuning*” (each auto-adjustment session commanded by the operator).

Auto-tuning Status

With following conditions fulfilled:

- **Index is stable:** Engine is in steady state operation, indicated by a stable governor index
- **Index is sufficient:** Index is above minimum required level (app. 25% load, can be plant dependent)
- **Sensor values:** Valid sensor values are available from the PMI auto-tuning system and deviation between cylinders as well as towards the reference are not too large

The functions for auto-tuning are available, informed in the status bar as “Tuning allowed” (green).
If one or more conditions are not met, the status bar will display “Tuning not available”, and indicate the reason here fore (yellow or red).

Continuous Auto-tuning

With continuous auto-tuning selected by the operator, the mean pressure level of Pmax will automatically be adjusted in order to minimise the deviation between ordered and measured mean Pmax. The continuous function is only active if the above conditions are fulfilled and will adjust only within narrower limits than available to manual adjustment. The adjustment offsets applied by the continuous function are displayed in the lower right corner of the “Mean” field.

User-controlled Auto-tuning

The cylinder pressures are automatically adjusted once, each time the operator presses the command button in the toolbar. This is available for adjusting either the engine balance or the mean pressure level:

- **Balancing**
  By pressing the “Deviation” field ... The operator can command an auto-balancing, that will balance the engine in respect to one or all of the key parameters Pmax, Pcomp or Pi.
- **Mean Deviation**
  The operator can command an auto-mean deviation adjustment. The result will be a minimised deviation between the ordered and the actual mean pressure. This function should be used when de viation is larger than allowed to be adjusted automatically by the continuous auto-tuning function.

NOTE

The user-controlled mean deviation function is intended only for adjustments in relation to fuel property changes, and only when engine is running above Pmax Break Point. Executed at lower loads, it is required for safe engine operation to check the maximum pressures and re-adjust if necessary when engine load is increased.

CAUTION

Applying an offset in Pmax at low load (<BP), may lead to too high Pmax at high engine loads.

1.4.2 Manual adjustment of process offsets

The cylinder pressures can be adjusted by manually setting the corresponding process offsets for control of fuel injection timing and exhaust valve closing time

Cylinder load

From the “Cylinder load” tab, the operator can adjust the load limit on any cylinder, adjust the load balance as well as cut out one or more cylinder units, however only at Chief level. Before taking a cylinder out of operation the restriction in section 704-04 in the Operation Manual must be taken into consideration.

Cylinder pressure

From the “Cylinder pressure” tab, the operator can manually adjust Pmax level and balance, Pcomp-Pscav ratio and exhaust valve open timing.

NOTE

The “PMax offset all” function is intended used when engine is running above Pmax Break Point. Executed at lower loads, it is required for safe engine operation to check the maximum pressures and re-adjust if necessary when engine load is increased.

⚠CAUTION

Applying an offset in Pmax at low load (<BP), may lead to too high Pmax at high engine load

1.4.3 Fuel Quality

On this screen a function for in- or decreased fuel oil index for all cylinders (FQA = Fuel Quality Adjustment) is available, e.g. in case of changed fuel quality. The specific calorific value and fuel oil density must be checked in the actual fuel oil specification delivered with the fuel samples at bunkering.

When entering new bunker values the ME system will suggest a new value for Fuel Quality Offset. The ‘Suggested Fuel Quality Offset’ does not influence the engine in any way. In order to change the actual running conditions it is necessary to change the ‘Applied Fuel Quality Offset’.

Adjusting the ‘Applied Fuel Quality Offset’ is required in order to make sure that the internally calculated ME-ECS load (as displayed on the process information screen, see Plate 70326) corresponds to actual engine load (as estimated by e.g. PMI equipment).

Ensuring this match in internal and external power estimation is an important aspect of getting correct functioning of the ME system.

The ‘Suggested Fuel Quality Offset’ is a good starting point for finding the correct ‘Applied Fuel Quality Offset’ however the final value must be found in an iterative process where internal load estimation and external load estimation are compared and ‘Applied Fuel Quality Offset’ is adjusted.

NOTE

Mismatch between internal and external load estimation can give rise to a wide range of problems. Including, but not limited to, too restrictive fuel index limiters, wrong cylinder pressures and wrong CLO usage.

1.5 Chief Limiters (See Plate 70328)

This screen gives the engineer the opportunity to set the following parameters:

1. Maximum Engine Speed.
2. Manual limitation of index at all cylinders.
3. Cut Out of one or more cylinders.

Additionally the states of all HCU can be seen, and it is possible to reset HCU related failure if needed.

In Chief Index Limit [%] press the cylinder bar graph involved. A toolbar at the bottom of the screen allows the operator to limit fuel injection on the chosen cylinder. When the cylinder is to be reenabled, the bar graph of the cylinder involved is pressed and the fuel injection is raised using the arrows on the toolbar followed by pressing “Apply”.

1. Auxiliaries

The Hydraulic System, Scavenge Air and Cylinder Lubrication are monitored in the Auxiliaries main navigator.

From each menu, the operator can control and monitor these systems.

The screens are:

1.1 Hydraulic System

1.2 Scavenge Air, also including WHR, VT and Exhaust Gas by-pass if these are installed.

1.3 Cylinder Lubrication

1.1 Hydraulic System (See Plate 70329)

This screen shows a simple schematic drawing of the HPS (Hydraulic Power Supply). The screen shows from three to five engine-driven pumps (depending on engine layout) and two electrically driven start-up pumps. A bypass valve from pump pressure side to suction side is also shown.

EL-HPS: On some plants the main HPS pumps are not engine-driven but instead electrically driven (EL-HPS). In this case there will be no start-up pumps or bypass valve. Apart from that the following description is valid also for EL-HPS, just ignore the word 'engine-driven'.

If, for some reason, control signal to an engine-driven pump is lost, the pump swash plate is deflected to 100% in ahead direction. Thereby ensuring adequate hydraulic power for running ahead.

NOTE

On engines with 4 or 5 engine-driven pumps, pump 4 is controlled from ECUA and pump 5 is controlled from ECUB (see plate 70317)

The following buttons can also be activated directly from the screen in Chief level:

- HPS Mode
- Pump Torque Limiter
- Set Point
- Bypass

1.1.1 HPS Mode

Pressing the HPS Mode button activates a toolbar at the bottom of the screen. At Chief level, it is possible to switch between Auto and Manual mode.

In Auto mode it is possible to perform the following commands (both Operator and Chief level)

1. Select one of the electrically driven pumps as master.

2. Select one of the engine-driven pumps as pressure controlling pump.

In **Manual mode** (Chief level) the additional command features are:

1. Adjustment of the current hydraulic pressure set point (see Section 1.1.3 in this Chapter).

2. Operate engine-driven pumps bypass valve using either ACU1 or ACU3 (Bypass valve to be tested for movement every 6 months, at stopped engine, see 1.1.5 in this Chapter).

3. Start/stop of the electric start-up pumps.

1.1.2 Pump Torque Limiter

In this field, it is possible to cancel the Pump Torque Limiter. (Chief-Level)

The torque limiter has two functions:

1. The total torque to the engine-driven pumps must not exceed a level that can harm gear and chain. Hence, to protect gear and chain, the sum of the swash plate positions must not exceed a predefined value. (Engine specific).

2. To protect the individual pumps from breakdown or damage.

By pressing the Pump Torque Limiter field, a toolbar will appear, where the limiter can be either activated or cancelled. (Cancellation of the limiter will raise an alarm on the MOP).

When the limiter is cancelled, the electrically controlled swash plates in the pumps are allowed to deflect to the mechanical limitation, if the need is there. (When the limiter is active, they are only allowed to deflect to an electrically controlled maximum position).

1.1.3 Set Point and Hyd. Oil

Adjustment of the oil pressure set point can be done from the Set Point display, where the actual set point is always shown. The engine must be running. The actual oil pressure is shown at the display as Hyd.Oil.

NOTE

Adjustment of the Set Point (Chief level and manual mode) is only intended as an option in test or failure situations.

As default, the normal operating pressure is in the 200-300 bar range and is set at commissioning. The engine shutdown level is approximately 140 - 180 bars, also set at engine commissioning. Both the operating pressure and the shutdown pressure is engine dependent.

The pressure set point is only relevant for the engine-driven swash plate pumps, as the pressure of the start-up pumps is limited via mechanical adjusted pressure limiting valves. The start-up pumps are automatically stopped or startet as needed.

1.1.4 Double Pipe (Engine dependent)

This display shows the pressure in the outer pipes of the high pressure double pipes. Normally, this pressure should be in the 0-10 bar range, depending on the specific engine layout. See section 708-08 in the operation manual for more details of the hydraulic system.

1.1.5 Bypass Valve

On the main pressure line from the engine-driven pumps, a bypass valve is installed.

At normal running with HPS mode in “Auto”, the bypass will open in the event of shutdown of the engine (wind milling can occur). This ensures oil return to the suction side of the pumps and thereby avoids cavitation and unintended wear on the pump parts.

Also, if the shutdown is due to a leakage at the high pressure side, and the engine keeps turning due to wind milling, the amount of oil spilled can be reduced by leading the oil back to the suction side.

By checking the valve manually, it is ensured that the valve is working properly. (The valve is to be checked manually every 6 months.) See chapter 702-01 in the operation manual.

The bypass valve is tested at engine still stand, in Chief level and the HPS mode in manual. For redundancy reasons the bypass valve is controlled both via ACU1 and ACU3.

1.2 Scavenge Air (See Plate 70330)

The scavenge air screen contains information and controls for monitoring and operating the auxiliary blowers, exhaust gas bypass and VT System. (engine dependent).

By pressing the “Details” button, indication of the current scavenge air pressure is shown for each individual scavenge air sensor.

The blowers are normally operating in Auto mode. Operating conditions are:

The blowers are started when :

- "prepare start" button is pressed (Operation Screen)
- manoeuvring handle is moved to start position, prompting the system to perform an automatic prepare start (engine start is delayed until blowers are running and pressure is correct)
- engine is running but the scavenge air pressure is below a certain value (e.g. during manoeuvring)

The blowers are stopped when

- engine is shut down
- the current sub-telegraph command state is moved to FWE position
- 10 minutes after engine has been stopped (adjustable)
- engine is running and the scavenge air pressure is above a specified level
- After prepare start if no start has occured within the pre-determined time

If a switch to manual operation is required, this is done by pressing the "Blowers Mode" push button (see Plate 70330). By pressing the individual blower 3D display at chief level and manual mode, it is possible to start or stop the individual blower.

The screen contains 2 to 5 blowers, depending on the engine layout. The state of each blower is shown. Status is either stopped, starting, running or failed.

Manual operation of the blower is mainly intended for use during fault-finding and test situations. Selecting Manual Mode will therefore also raise an alarm on the MOP.

1.3 Exhaust Gas Bypass and VT System (engine dependent)

Monitoring of the Exhaust Gas Bypass Systems and VT System is performed from the Scavenge Air screen.

The actual positions and settings of the on/off bypass, the variable controlled by-pass valves and VT System are always shown on the screen.

By pressing the "Bypass Mode" push button (chief level), the bypass valve modes can be changed between automatic and manual.

In manual mode (chief level), the variable controlled bypass valve can be opened/closed or set to the angle desired.

In manual mode (chief level), the on/off bypass can be opened or closed.

For a detailed description of the VT System and Exhaust Bypass System see separate manuals.

1.4 Cylinder Lubricators (see Plate 70331) ME Lube

The ME lube Control System provides the operational monitoring and control of the ME cylinder lubrication plant which lubricates the cylinders in the ME type engine.

The following displays can be monitored:

1.4.1 Flow *(l/h)*

1.4.2 Basic Feed Rate *(g/kwh)*

1.4.3 Actual Feed Rate *(g/kWh)*

The following displays can be operated at Chief level.

1.4.4 Total

1.4.5 Prelube

1.4.6 LCD

1.4.7 S% (*Sulphur Content*)

1.4.8 Feed Rate Factor

1.4.9 Min. Feed Rate *(g/kWh)*

1.4.10 Feed Rate Adjust Factor

1.4.11 Running In *(g/kWh)*

1.4.12 Lubricator Test Sequence

NOTE

The latest Service Letter from MAN Diesel & Turbo should be consulted with regards to feedrate adjustments and settings.

1.4.1 Flow

The Flow display shows the ordered lube oil amount in litres/hour.

NOTE

If one or more lubricators are malfunctioning (e.g. Feedback Failure) the actual amount applied will differ.

1.4.2 Basic Feed Rate

The Basic Feed Rate is a calculated rate for the complete lubricator system in **g/kWh** shown with two (2) decimals. The formula for calculating the Basic Feed Rate is = S% x (FEED RATE FACTOR).

1.4.3 Actual Feed Rate (each cylinder)

The bar graphs for each individual LCD shows the actual feed rate per cylinder. When running at low load the full bar is barred and the upper display on the bar graph shows “Low Load”.

1.4.4 Total

The Total display shows the total ordered amount of lubricating oil used since last power up of the ECU involved. Pressing this display opens a toolbar with the option to reset the total amount of lubricating oil.

Both of the values Flow and Total are based on the ordered numbers of lubrication strokes and the displaced amount per stroke.

1.4.5 Prelube (for test purpose)

As stated above this button is mainly used for test purposes, since the prepare start will cause the system to automatically perform a prelube.

When the “Prelube” button is pressed a toolbar is shown on the screen.Pressing the button “ON” triggers a prelubrication on all cylinders and evaluates feedback from the lubricators.

NOTE

Prelubrication can only be activated if hydraulic pressure is present. This demands that the engine (Sub-telegraph) is put in the state “Standby” or that the Hydraulic start-up pumps are set at manual operation and started.

1.4.6 LCD

The LCD display shows whether the LCD (Load Change Dependent) lubrication is on or off. When the LCD button is pressed, a toolbar will be displayed which will allow the operator to disable the LCD.

1.4.7 S %

Activating the display S % enables adjustment of the Sulphur content equal to the

sulphur content in the HFO used. The range is between 0.00 to 5.00 S % and is not adjustable outside this range.

1.4.8 Feed Rate Factor

Activating the display Feed Rate Factor enables adjustment of the feed rate for all cylinders. The display shows the feed rate with 2 decimals and is “g/kWh%S”.

1.4.9 Min. Feed Rate

The display Min. Feed Rate enables adjustment of the minimum feed rate for all cylinders. The value is displayed in g/kWh and is normally set to 60% of the basic recommended feed rate.

1.4.10 Feed Rate Adjust Factor

Activating the display Feed Rate Adjust Factor enables adjustment of the feed rate for each cylinder separately.

1.4.11 Running in [g/kWh]

When a cylinder is being run-in, the feed rate can be entered by this display. Running-in of a single cylinder is described in Section 707-01 in the operation manual. The latest service letter from MAN Diesel & Turbo should be consulted as mentioned earlier.

1.4.12 Lubricator Test Sequence

Pressing the Lubricator Test Sequence starts a continuous activation of the lubricator at predefined injection rate (different from “Prelube” 1.4.5 where the injection of oil is done at the fastest possible speed.)

This feature is used after repairs, etc. on the lubricator(s), enabling the engineer to manually check the lubricator for leaks and injection.

If a single button (cylinder 1, 2, 3, etc.) is pressed, a toolbar is shown on the screen. The toolbar enables the engineer to start test of the lubrication on the particular cylinder concerned or on all lubricators.

In case of CCU failure (and the CCU can not be replaced immediately) please see instruction S903-0031 for how to obtain the back-up signal for lubrication.

NOTE

The lubricator test can only be activated if hydraulic pressure is present. This requires that the engine (Telegraph) is put in state “Standby” or that the Hydraulic start-up pumps are set at manual operation and started.

1. Maintenance

The maintenance screens give an overall view of the status of the ECS system seen on the following three screens. Plates 70332 – 70333 – 70334.

1.1 MPC description

1.2 System View I/O Test

1.3 Invalidated Inputs

1.4 Network Status

1.5 Function Test

1.6 Troubleshooting

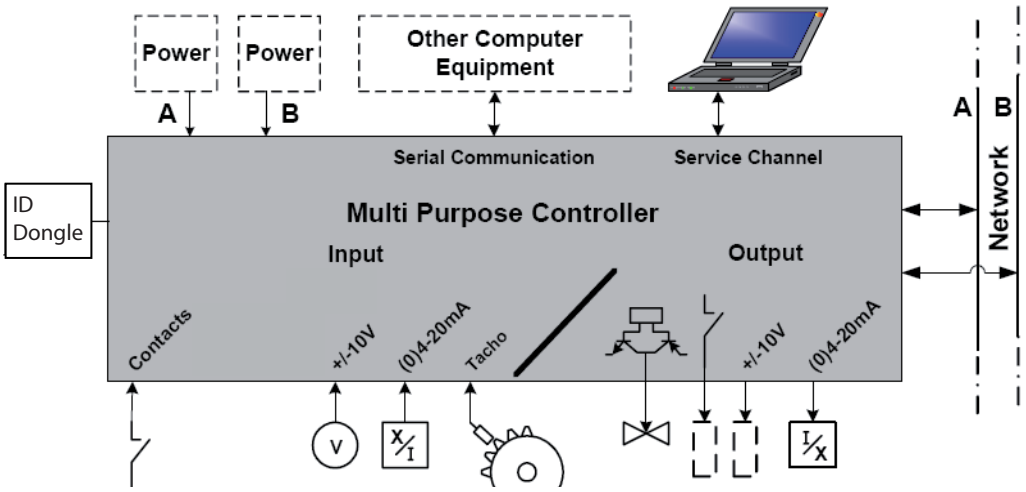
The above-mentioned five maintenance screens can be accessed via the secondary navigator by pressing the “Maintenance” button in the main navigator. They are mainly used at engine commissioning, during fault finding on I/O cabling/ channels and external connections to sensors and during engine operation. The use of these screens is therefore relevant for engine crew as well.

1.1 MPC description

To understand the use of these screens, an explanation of the layout of the Multi Purpose Controller (MPC) is appropriate.

The MPC is a computer unit which has no user interface such as a display or a keyboard, but has a wide variety of inputs/outputs (I/O) for interfacing to sensors and actuators of the engine, e.g.: (see drawing next page).

- Inputs for e.g. tacho signals, standard (0)4-20mA transducers, ±10V signals, switches and 24V binary signals
- Outputs such as (0)4-20mA and ±10V signals, contacts and high-speed semiconductor switches.
- Duplicated Control Network for security
- Serial communication controller for either a Remote I/O Network or point-to point serial communication.
- Service channel to be connected to a laptop PC for service purposes.



The main processor of the Multi Purpose Controller is a Motorola 68332, which is a 32-bit processor and widely used in the automotive industry. It includes an on-chip timing coprocessor for synchronisation with the crankshaft rotation and speed measurement.

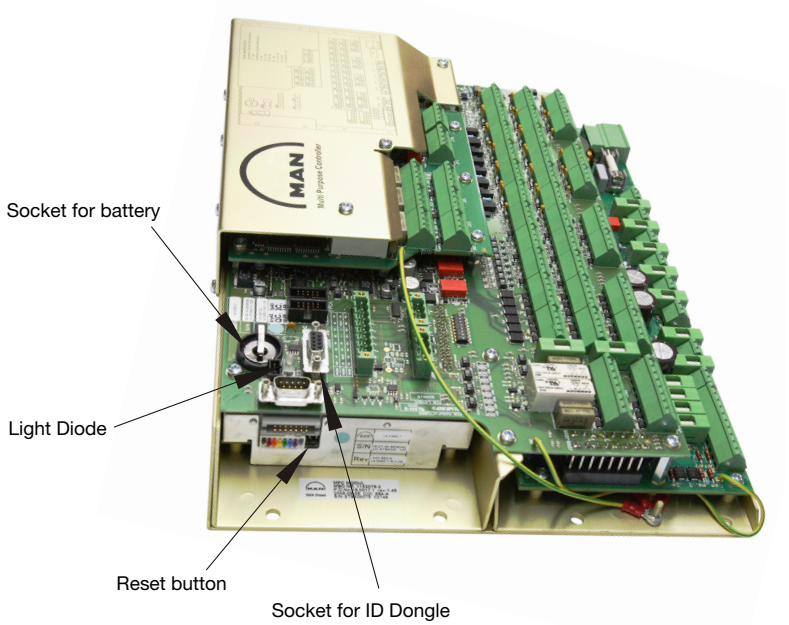
To ease the production of the Multi Purpose Controller, all programmable components are in-circuit programmable, which also allows field update of the controller by means of relatively simple tools. The MPC contains no harddisk or other sensitive mechanical components, and the software is stored in a non-volatile Flash-PROM memory, this allows for the application software to be sent to and programmed into the Multi Purpose Controller through the network, and thereby restore the functionality after the Multi Purpose Controller has been exchanged with a spare unit from stock.

The MPC is, as shown on the picture equipped with a battery. This battery is used for back-up power to the clock – watch of the MPC in the event that the 24 V power is turned-off. All clocks of all MPC's are synchronised via the network. Synchronisation is done regularly and always after power is on after a possible power off. Regarding battery in MPC: See S-instructions S906-0039 and S906-0040.

When a new MPC is mounted in the cabinet, the dongle in the cabinet is mounted in the dongle plug-in, after reconnection of all wires, and before connecting power. The dongle tells the "new" MPC in which cabinet it is mounted and, in that way, which software and parameters it should upload from the MOP harddisk (e.g. CCU1, ACU 3 or EICUA).

The MPC is also equipped with a light diode, capable of showing green, yellow or red light. This light tells the engineer what the status of the MPC is.

During normal running the diode is green. When the diode is yellow, the MPC is rebooting or is in Test or Configuration Mode. When the diode is red, the MPC is unavailable. If resetting does not solve the problem with the red diode then replacement of the MPC might be neccesary.



1.2 System View I/O Test (See Plate 70332)

The icons (plate 70332 1(4)) shown on the controllers, show the status of each single controller, e.g. whether it is in mode:

Active	
Controlling	Ctrl
Test	T
Configuration	C
Blocked	B
Not accessible	

By pressing a single controller on this screen (in this case CCU1 is pressed and shown on Plate 70332 2(4)), the actual inputs/outputs on the selected controller are shown.

The screen shows Info, ID and Descriptions and process values of each single channel on the MPC.

It is possible to see each single channel in both Normal and Test Mode, but to set an output channel manually, Test Mode has to be chosen.

⚠CAUTION *Changing to TEST Mode will STOP the MPC from controlling the system.*

By pressing the channel number to the left of the individual channel, for instance screen 3(4) on Plate 70332, a single channel is shown (in this case, channel 30 on CCU1). The status and values of this channel are listed on this screen.

From this screen, input channels can be invalidated and validated again see page 4(4) on Plate 70332 (Chief Level).

⚠CAUTION *Changing the status of a channel may cause the system to malfunction.*

The reason for alarm on an input could for instance be a defective sensor or loose wiring from the sensor to the MPC.

If a channel is invalidated, the ECS will continue to operate in the best possible way, without the invalidated input sensor value.

1.3 Invalidated Inputs (See Plate 70333)

If an input channel is invalidated (as described in Section 1.2 above), it is listed on the screen “Invalidated Inputs”. ID number, signal ID and a short description to easily overview and recognise the channel(s) involved are shown on this screen.

The “Invalidated Inputs” screen is an overview helping the engineer look through and control which channels are invalidated.

Input Channels Invalidated can be validated from this screen (Chief Level).

⚠CAUTION *Changing the status of a channel may cause the system to malfunction.*

1.4 Network Status (See Plate 70334)

This screen gives the engineer an overall view and exact status of the Control Network of the ECS

From this screen, it is possible to see the status of the Network using the icons named below: (Icons are visible at Plate 70334, bottom)

- OK 
- This MOP 
- No Reply Single Channel 
- No Communication 
- Not Accessible 
- On-line But No Information 
- Not Relevant 
- Reference 
- Cross Connection 

When all fields are shown with a green √ (check mark) everything is okay.

1.5 Function Test (See Plate 70348)

The Function Test tab consists of 3 items (submenus),

1.5.1 HCU for each cylinder

1.5.2 Tacho Equipment

1.5.3 HPS for each pump

The main purpose of these three screens, is to provide the engine personnel with a tool to test the function of the HCU, HPS and tacho equipment and their related components. Also the function test screens are used when replaced components are to be calibrated, e.g. in case of replacement of a fuel plunger sensor.

The function test screens are made as a step-by-step procedure, guiding the engine personnel through the tests. Each test begins with a few preparation steps in order to ensure the right conditions before commencing the actual test. The MOP must be in chief access level and if not otherwise stated, the engine must be stopped before commencing the test.

NOTE

When rebooting an MPC in test mode, multiple alarms irrelevant to the test may occur.

1.5.1. HCU

The HCU tab is focusing on the FIVA valve. Depending on the configuration, the list contains three or two function tests. Only the FIVA valves with external amplifier have the option of an Amplifier Test. In the following all three function tests are explained.

NOTE

As the HCU function test list is longer than the height of the screen a scrollbar is placed to the right.

Preparation of HCU Test

To begin the function test press the button START and follow the steps on the screen.

NOTE

In order to verify that the fuel booster or exhaust valve are functioning as expected, an assistant must be stationed on the engine top at the unit in question during the test. For this test fuel pressure must be present.

Test of FIVA valve and calibration of Fuel Plunger

If the CCU MPC is not in test mode when the START button is pressed, the engineer is prompted to switch to test mode and reboot the MPC. Once the MPC has been rebooted, the function test will continue.

⚠CAUTION

For testing of the fuel injection components, the FIVA will make one fuel injection.

The fuel injection is verified by the assistant on the engine top by feeling the shockwave on the respective fuel injection pipe, and feeling on the high pressure pipes.

For testing the exhaust valve components, the FIVA will activate the respective exhaust valve once. This is verified by the assistant, by listening for the ”thump” sound of the exhaust valve opening and closing.

The test values are listed on blue background in the far right column when the function test is finished and will under normal circumstances be within the default reference range listed next to the test value column.

If for some reason the test value differs from the reference value, this will be shown in one of the following ways:

x.xV	Signal and value ok.
– – –	Signal not present. (check if the MPC is connected to the network)
x.x mA	Signal value outside reference range. (Value electrically out of range or wire-break)
x.xV	Signal value outside reference range. (Signal ok, unit mechanically out of range)

If the test is successfully completed then the user has the option to use the SAVE button to upload the new calibration setpoints to the MPCs. Should the save operation fail then another attempt should be made after approximately 30 seconds.

Amplifier test (*only applicable to Curtis Wright FIVA valves*)

This amplifier test enables the engineer to test the FIVA amplifier. When the START button is pressed a set of adjustment buttons will appear on the toolbar.

The adjustment voltage range for channel 70 lies between -3.6V to +3.6V. If signal value field for ch. 70 turns red, this normally indicates that something is wrong with the MPC

The signal value field for ch. 33 has the same different types of error indications as shown above. If any of these are triggered then this most likely indicates that something is wrong with either the amplifier or the connections to the amplifier.

NOTE

When testing the amplifier with voltages in the high end of the adjustment voltage range, deployment of the fuel booster may occur, resulting in fuel injection

Cyclic Test of Exhaust Valve and/or fuel injections

When START button is pressed, a set of buttons will appear on the toolbar, which enables the engineer to start a repeated cyclic test of the exhaust valve, in other words, the exhaust valve will continue opening and closing until the STOP button is pressed. Also for the fuel booster a single injection test is possible (both during the cyclic test and independent of this).

CAUTION

Activation of ”single injection” will lead to one full MCR fuel Injection in the cylinder. Several activation will lead to filling of the combustion with fuel oil.

Reboot of CCU

Reboot the CCU MPC to test mode in order to continue with tests or reboot to set the CCU MPC to normal operating mode (finished with function tests).

1.5.2. Tacho

The Tacho Test allows for the verification of the angles of the Tacho Pick-Ups and angle encoder fine adjustment of certain parameters.

Pre-Start Test

Press Start and follow the instructions on the screen. Make sure that an assistant is standing by to activate the Turning Gear, and verify the crankshaft position.

During the test the following is displayed on the screen:

A: xx B: xx (blue background):
If the crank has been turned to the prescribed angle when the background is blue, then the value is correct. Continue to next step.

A: xx B: xx (yellow background):
If the crank has been turned to the prescribed angle and the background is still yellow, then the test has failed. Continuation of the test is not possible. By pressing the details button, specific information regarding the failure is displayed. Check and adjust the Tacho arrangement.

The x in the test can be either T or F

Setting of Fine Adjustment Parameters

As indicated on the screen a certain minimum engine speed is required in order for the ME system to measure a correct ‘delta Tacho-B’ value.

The ’Trigg Offset AH’ value that is to be entered must be taken from the PMI equipment (see PMI manual). The ‘Trigg Offset AH’ value is not measured by the ME system, that is why a PMI-0 diagram is required as part of the setting of the final Tacho parameters.

1.5.3. HPS

The HPS function Test allows for the test and calibration of the hydraulic pumps. Up to 5 pumps can be present depending on system configuration, each tab corresponds to a pump.

Preparation

To start the test press ” Start ” and make sure that a start-up pump is in local control on the starter cabinet, and running so that the necessary hydraulic pressure can be maintained.

Test

Press ” Start ” and follow the instructions on the screen. Make sure an assistant

is standing by at the pump to check the swash plate angle.

During the test the following is shown on the screen:

Icons with background colours can be seen in chapter 1.5.1

x.x mA (blue background): value ok - go to next step.

x.x mA (red background): value is outside the measurement interval (4-20mA) continuation of the test not possible - check the sensor and cables.

x.x mA (yellow background): value differentiates from the reference value. Continuation of the test not possible. Check the sensor.
If all of the steps are satisfactory calibration of the specific pump is carried out by pressing " Save ". The test is concluded by rebooting the MPC back to Normal Mode.

1.6 Troubleshooting (See Plate 70349)

This screen is used for performing troubleshooting on the Hydraulic Cylinder Unit and Hydraulic Power System. The HCU Events and HPS Events are used to show the actual movements of FIVA valve, plunger positions, exhaust valve movements and swash plate positions in graphs.

1.6.1 HCU (See plate 70349 page 1-5)

On this screen FIVA activation can be performed to execute fuel plunger and exhaust valve movement to check whether the system is working correctly.

Activation of the FIVA is performed by changing MPC Mode into Test Mode and activating the buttons displayed in the toolbar.

The cyclic test is only a cyclic activation of the exhaust valve.

⚠CAUTION *Activation must only be performed with stopped engine. Each activation of the fuel plunger results in a fuel injection into the cylinder.*

1.6.2 HPS (See plate 70349 page 6)

On this screen the swash plate position for each pump can be regulated to check whether the system is working correctly.

Activation of the swash plate position is performed by changing MPC Mode into Test Mode and activating the buttons displayed in the toolbar.

The swash plate position can be seen on input ch 34 and compared with the desired setpoint.

When finish testing put MPC back to normal mode.

1.6.3 HCU and HPS Events (See plate 70349 page 7-8) (Only available on MOP B)

These screens are an aid for the engineer and are used to monitor the actual movements of the HCU and HPS related signal. E.g. used to identify trouble in case of a malfunction of the electrical and mechanical components.

The HCU and HPS Events include a lot of very useful information for e.g. trouble-shooting.

It can however in certain cases be difficult to make quantitative conclusions based on HCU and/or HPS Events logs taken during a situation where problems are present (e.g. deviating cylinder pressures, hunting hydraulic pressure, etc.).

In those cases it is very helpful to have HCU and HPS Events logs from periods where there were no problems or irregularities. By comparing these logs with logs from situations where problems are present it is often possible to make qualitative conclusions regarding the current problems.

Therefore it is recommended to take manual HCU and HPS Events logs from time to time when no problems or malfunctions are present.

A suggested procedure is to make a note regarding the current speed, index and internal estimated power together with the names of the HCU and HPS Event logs and then save these on either a USB stick or some other computer (so the logs are still available even if MOP-B is later replaced).

NOTE

Always ensure that any USB memory stick inserted into the MOP is scanned and cleaned of any malware.

A list of available dumps can be found in the upper left part of the list - newest on top. To display the contents mark an element in the list and press ”Show Sequence”.

Both manual dumps (*Log Manually*) and automatic dumps can be performed for special failures/alarms .
The event which caused the dump is described in the text above the graph area. The time of alarm is shown as a vertical dashed line. The display of measured values can be turned on and off by pressing the buttons on the left side of the screen.

By clicking and holding *(the cursor turns into a hand*) in the area left of the Y- axis or in the area below the X - axis, the graph can be moved vertically or horizontally.

Zooming can be carried out by drawing a square in the graph area while ”default view” can be recalled by pressing ” Zoom to fit ”

Storing both PMI diagrams and HCU Events logs from days with no problems, will greatly improve the options available for later troubleshooting. Therefore it is a good idea to take the HCU Events logs together with Performance Measurements and then save it all together.

1.6.4 CoCoS EDS

As described on Plate 70319 MOP B is connected to the CoCoS EDS PC (which also runs the PMI software).

CoCoS EDS is not a part of the ECS, however it is an essential tool with regards to troubleshooting and diagnostics.

Therefore it is important that CoCoS EDS is running correctly and that the connection is functioning. All the time.

The CoCoS EDS installation includes guidance on how to evaluate and troubleshoot the connection.

1.6.5 Data logging

In the case that assistance from external parties is needed, it is essential for trouble shooting that following data is delivered to external parties:

- A clear description of the case
- ECS Alarm/Event Log
- ECS parameter file (Spaf)
- ECS HCU data logger files
- ECS HPS data logger files
- EDS data logger files

Al this information can be gathered automatically with a program called “DatGat.exe” that is found on the CoCoS-EDS CD. A description on how to use the “DatGat.exe” program can also be found on the CoCoS-EDS CD. The program can also be downloaded from the following adress : **Https//dieselport.mandiesel.com**

The above mentioned data and logfiles will contribute to speed up the troubleshooting process, and are for that reason very important for external parties

1. System

The screens are:

1.1 Set Time

1.2 Version (software and IMO Check Sum)

1.1 Set Time (See Plate 70335)

At the Set Time screen, the operator is able to set the time/date for UTC (Chief Level required) or to set the time offset for Local Time in intervals down to 5 minutes.

Pressing on either button “UTC Date/Time” or button “Local Date/Time” will display toolbars (shown on Plate 70335). From these toolbars, Date and Time can be set.

Pressing the buttons “UTC Time displayed” or “Local Time Displayed” enables the operator to choose between the time to be displayed at the MOP panel (upper right corner) and in the lists (alarm list, event log etc.)

Alarms and logs are recorded with both Local Time/Date and UTC Time/Date regardless of which time/date is selected for displayed .

NOTE

Always ensure a correct setting of UTC. The ECS has no connections to the ship`s master clock

1.2 Version (See Plate 70336)

1.2.1 Background

This screen displays the version type of the ECS controlling the ME engine. It displays, in table format, all the controllers that comprise the system, including specific information relating to each controller.

1.2.2 Screen Items

In the upper system information line, general information of the ECS system for this particular engine is shown. The fields are: (See Plate 70336)

Product Name & Version	The name and version of the ECS software
Engine Group No.	The Engine number of the engine builder
IMO No	Engine IMO number (former Lloyds number)
Engine Builder	Name of engine builder
Eng. No.	Engine Serial number

1.2.3 Controller information

In the Controller information pane, data for each Controller in the system is dislayed. The pane contains the following:

1.2.4 Controller unit

ID	Name of MPC (controller)
Addr.	Network Address of MPC
Type	Application group the MPC belongs to (ACU, CCU, ECU, EICU or SCU)

1.2.5 Parameters Check Sums

The Parameter Check Sums are indications of the current parameter values in the ME system. They are used as a method for determining if parameters have been changed. Especially the IMO Design parameters must not be changed compared to shop trial values, since they control emission and performance relevant parameters.

No changes made on the MOP will change the IMO Design Parameters Check Sums.

NOTE

It is not possible to recreate the parameters of the ME system from the Check Sums, therefore sending a screen dump of this screen is not sufficient for external parties who inquire about specific parameter values.

1.2.6 Using the Screen

When the screen is first displayed, no information appears on the table. Press the "Refresh" button to retrieve the system information and parameter checksums of all controllers connected to the ECS. (See plate 70336.)

If at least one controller supplies information on the system that does not agree with the other controllers, a warning message is displayed in yellow in the specific controller unit and at the toolbar.

Pressing the Export button generates a hardcopy of the information displayed in the table that can be saved to a hard drive or USB memory stick. This exported file is compressed in Zip format and must be unpacked to be readable.
The file format is:
SWVersNParamChecksums on <Date & Time> for <MOP> <SW-version> on IMO <IMO number> Engine no <Engine number>.zip

NOTE *Always ensure that any USB memory stick inserted into the MOP is scanned and cleaned of any malware.*

1.3 Power Off

The Power Off button acts the same way as the "Shut Down" button in Windows Operating Systems on PCs.

Disclaimer regarding the ECS Screenshots

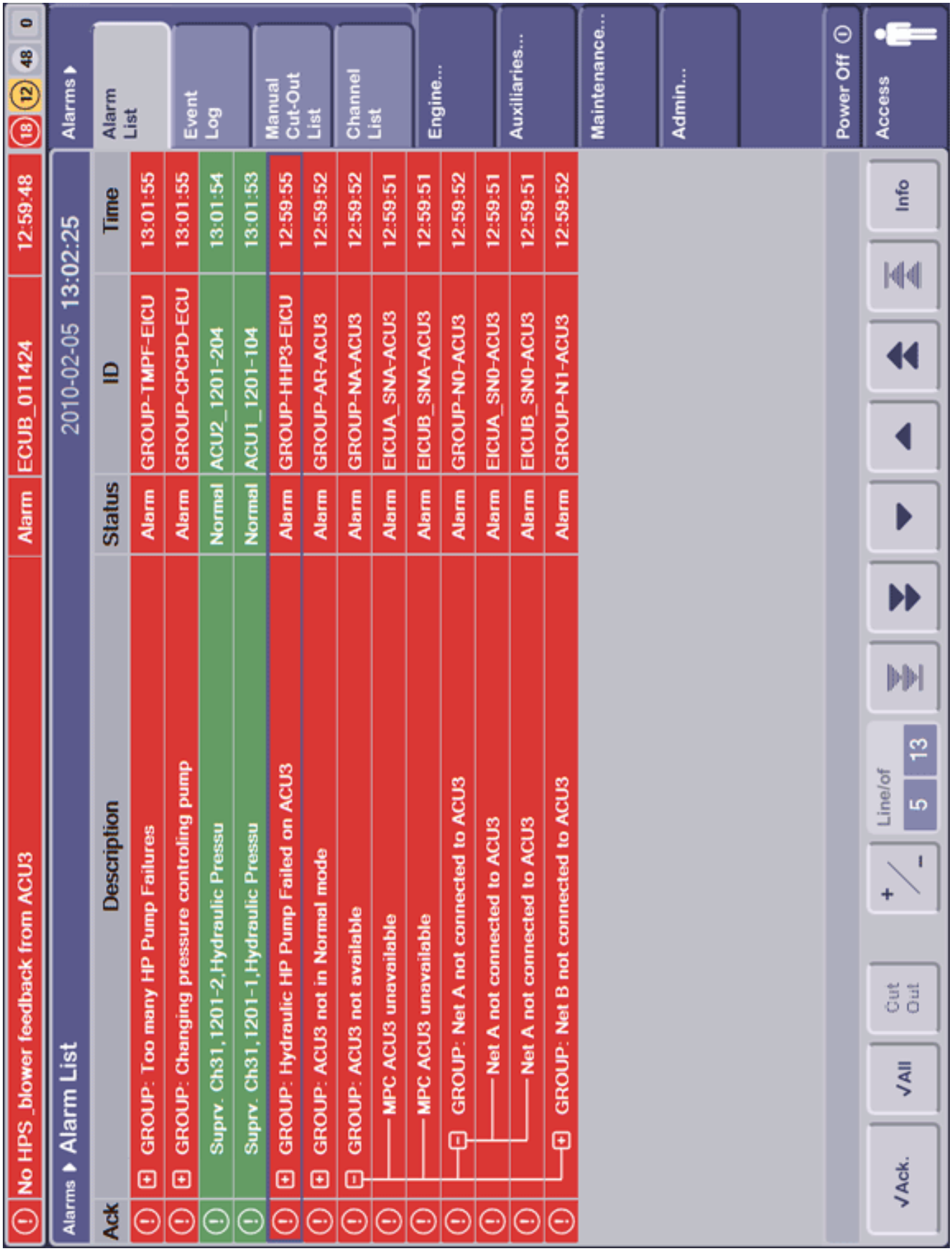
The following section of this manual includes a series of plates showing images of the MOP screens.

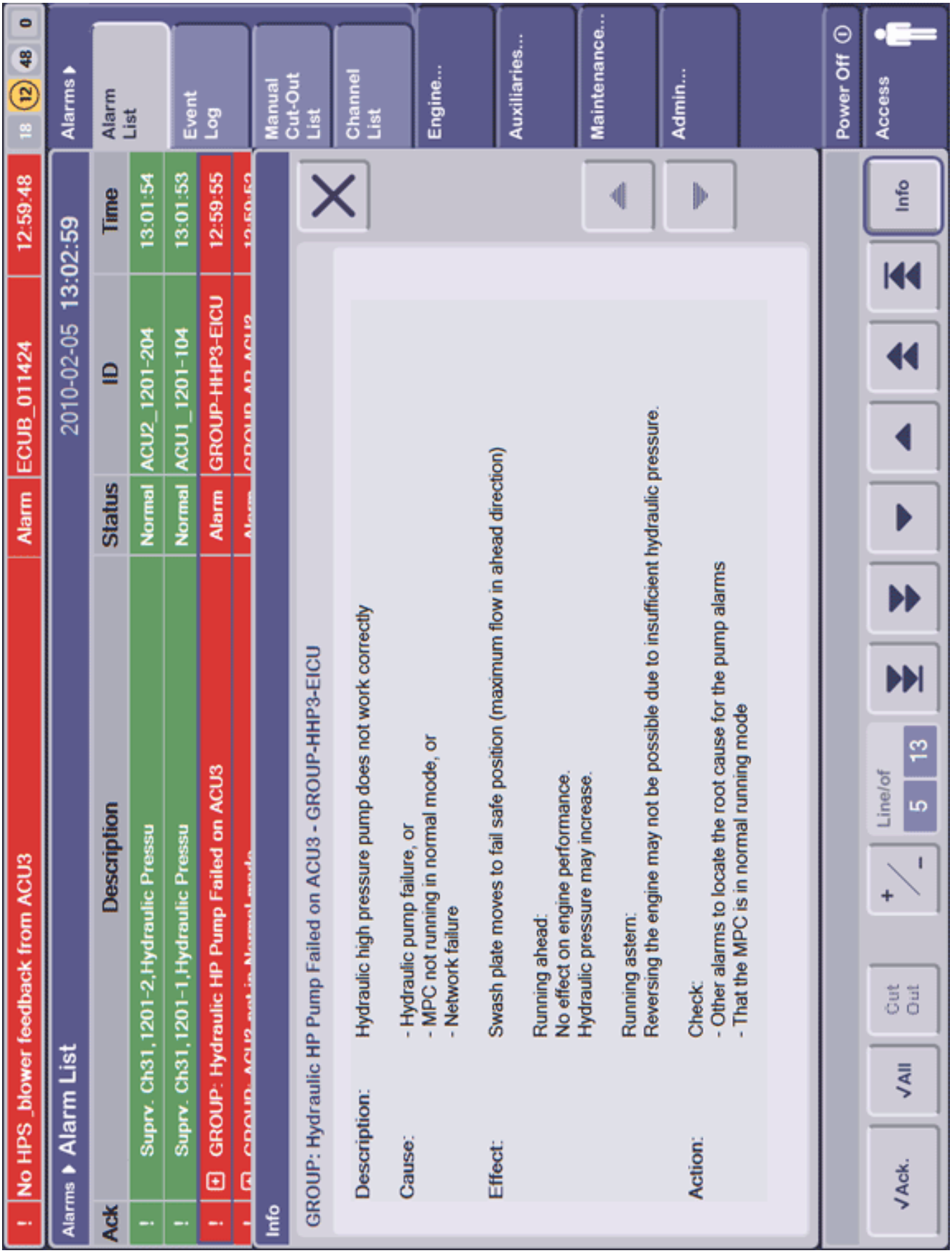
These plates are used for reference in the other parts of manual and are a strong visual aid in understanding and getting familiar with the ECS.

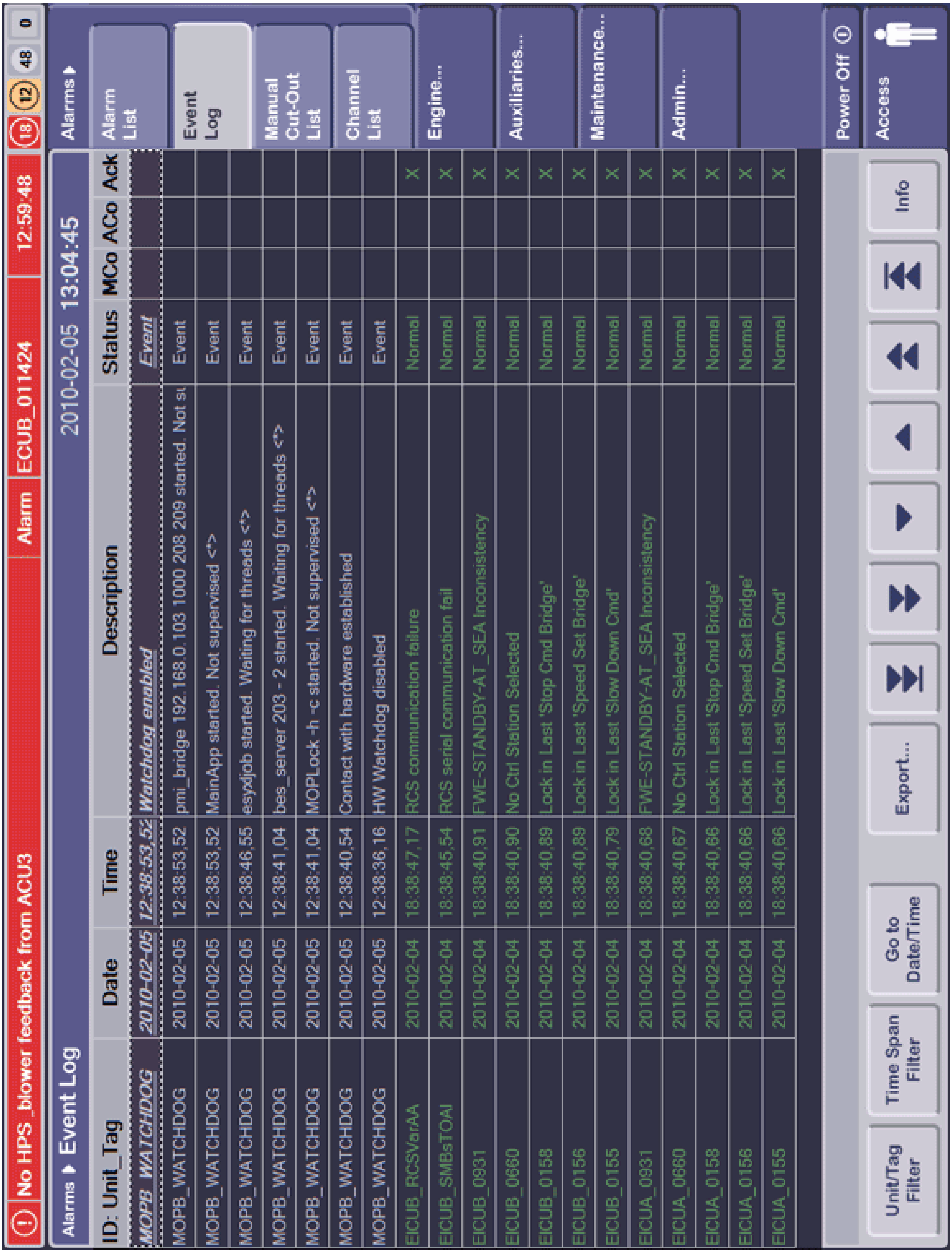
It is important to realize that the purpose of these screenshots is to illustrate the ECS user interface in a qualitative way – not to give quantitative information regarding the process control and feedback loops. The values displayed will not always be consistent with those experienced on a real plant.

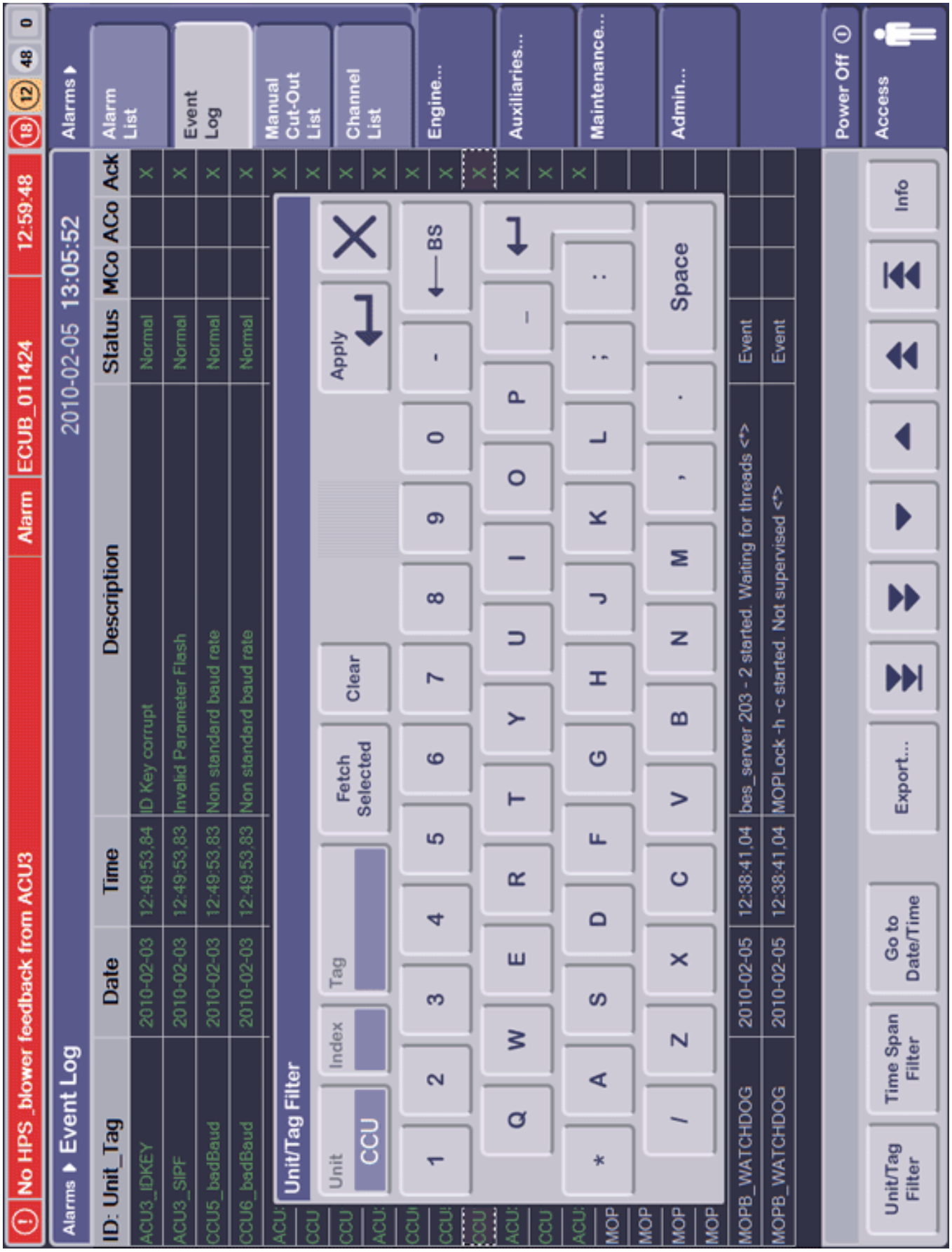
These discrepancies include (but are not limited to) the number of active alarms, process values and set points.

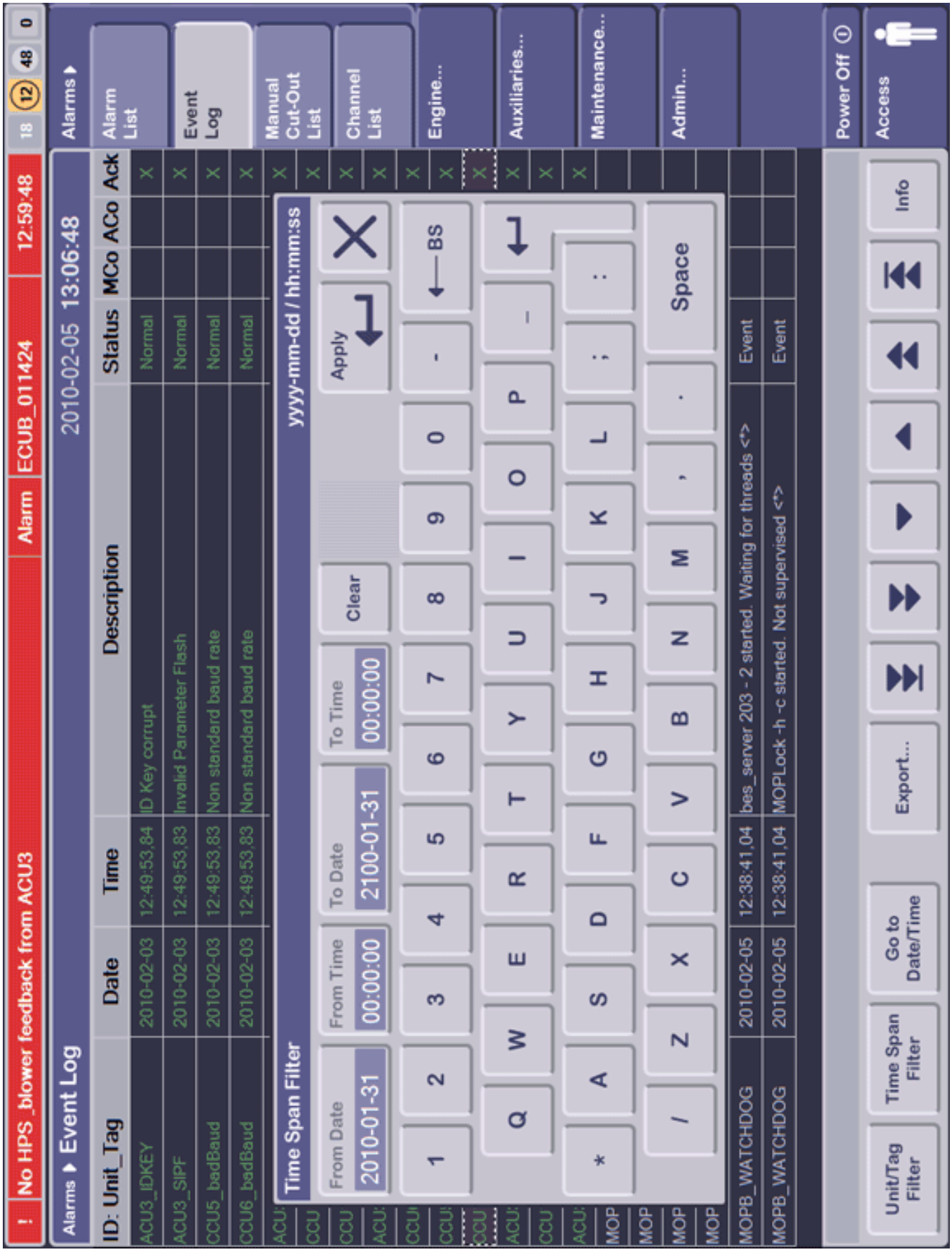
Always consult the specific plant in order to get the precise layout of the MOP screens.

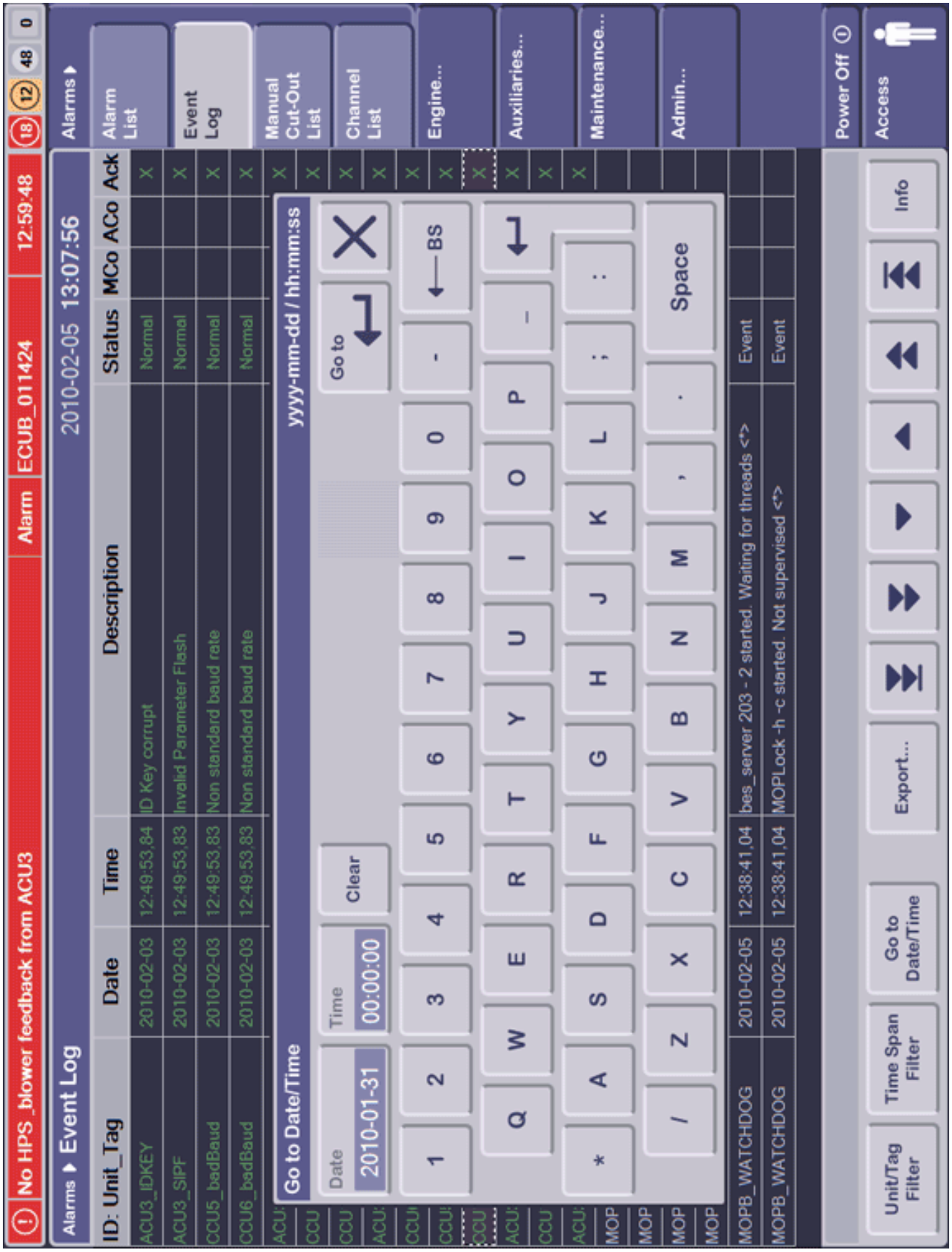

No HPS_blower feedback from ACU3
Alarm
ECUB_011424
12:59:48
18
12
48
0
Alarms
Alarm List
2010-02-05 13:02:25
Ack
Description
Status
ID
Time
GROUP: Too many HP Pump Failures
Alarm
GROUP-TMPF-EICU
13:01:55
GROUP: Changing pressure controling pump
Alarm
GROUP-CPCPD-ECU
13:01:55
Suprv. Ch31,1201-2,Hydraulic Pressu
Normal
ACU2_1201-204
13:01:54
Suprv. Ch31,1201-1,Hydraulic Pressu
Normal
ACU1_1201-104
13:01:53
GROUP: Hydraulic HP Pump Failed on ACU3
Alarm
GROUP-HHP3-EICU
12:59:55
GROUP: ACU3 not in Normal mode
Alarm
GROUP-AR-ACU3
12:59:52
GROUP: ACU3 not available
Alarm
GROUP-NA-ACU3
12:59:52
MPC ACU3 unavailable
Alarm
EICUA_SNA-ACU3
12:59:51
MPC ACU3 unavailable
Alarm
EICUB_SNA-ACU3
12:59:51
GROUP: Net A not connected to ACU3
Alarm
GROUP-N0-ACU3
12:59:52
Net A not connected to ACU3
Alarm
EICUA_SN0-ACU3
12:59:51
Net A not connected to ACU3
Alarm
EICUB_SN0-ACU3
12:59:51
GROUP: Net B not connected to ACU3
Alarm
GROUP-N1-ACU3
12:59:52
Alarm List
Event Log
Manual Cut-Out List
Channel List
Engine...
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Info
√Ack.
√All
Cut Out
+
/
-
Line/of
5
13

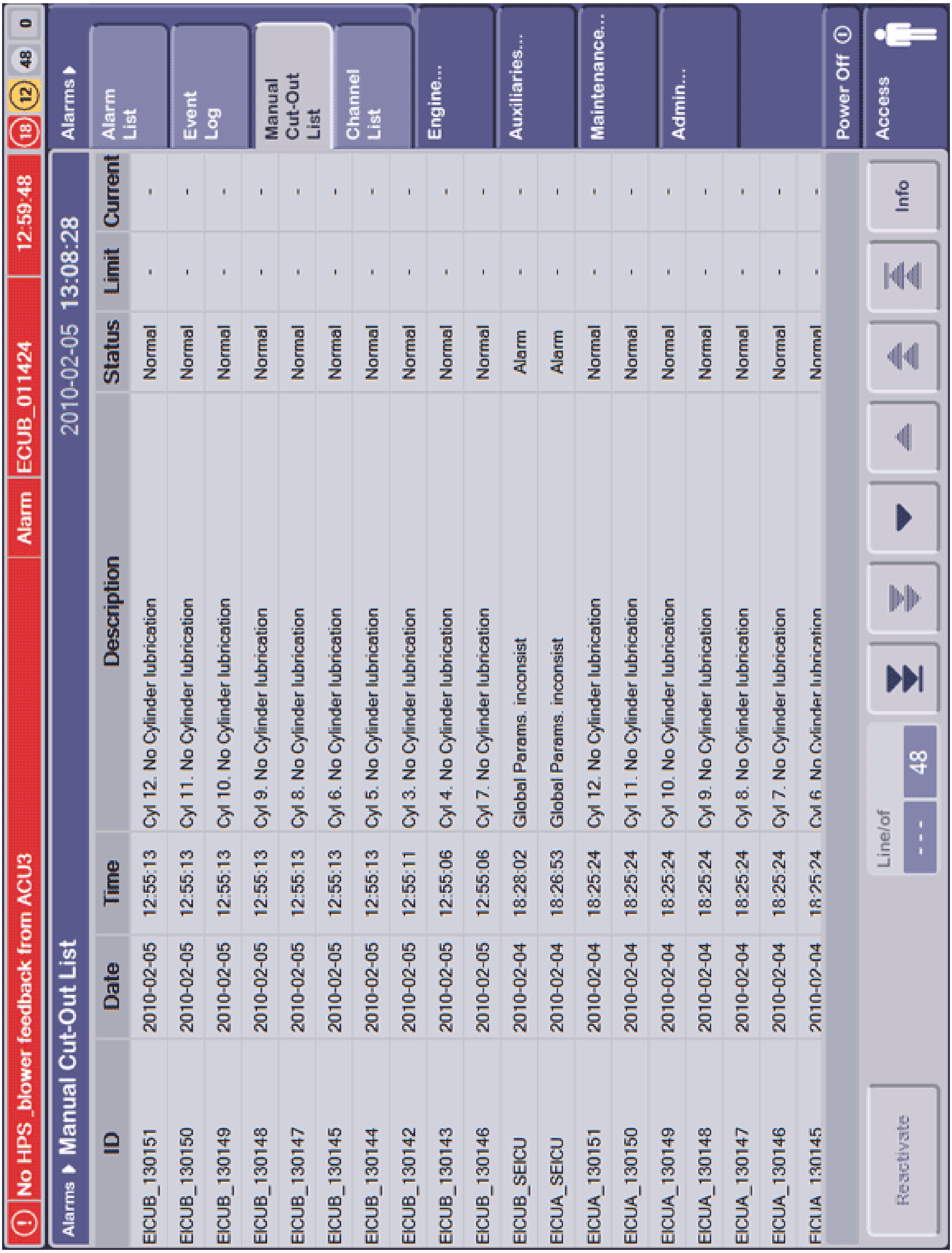

No HPS_blower feedback from ACU3
Alarm
ECUB_011424
12:59:48
18
12
48
0
Alarms
Alarm List
2010-02-05 13:02:59
Ack
Description
Status
ID
Time
Supry. Ch31,1201-2,Hydraulic Pressu
Normal
ACU2_1201-204
13:01:54
Supry. Ch31,1201-1,Hydraulic Pressu
Normal
ACU1_1201-104
13:01:53
GROUP: Hydraulic HP Pump Failed on ACU3
Alarm
GROUP-HHP3-EICU
12:59:55
Info
GROUP: Hydraulic HP Pump Failed on ACU3 - GROUP-HHP3-EICU
Description:
Hydraulic high pressure pump does not work correctly
Cause:
- Hydraulic pump failure, or
- MPC not running in normal mode, or
- Network failure
Effect:
Swash plate moves to fail safe position (maximum flow in ahead direction)
Running ahead:
No effect on engine performance.
Hydraulic pressure may increase.
Running astern:
Reversing the engine may not be possible due to insufficient hydraulic pressure.
Action:
Check:
- Other alarms to locate the root cause for the pump alarms
- That the MPC is in normal running mode
Alarm List
Event Log
Manual Cut-Out List
Channel List
Engine...
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Info
Ack.
All
Cut Out
Line/of
5
13

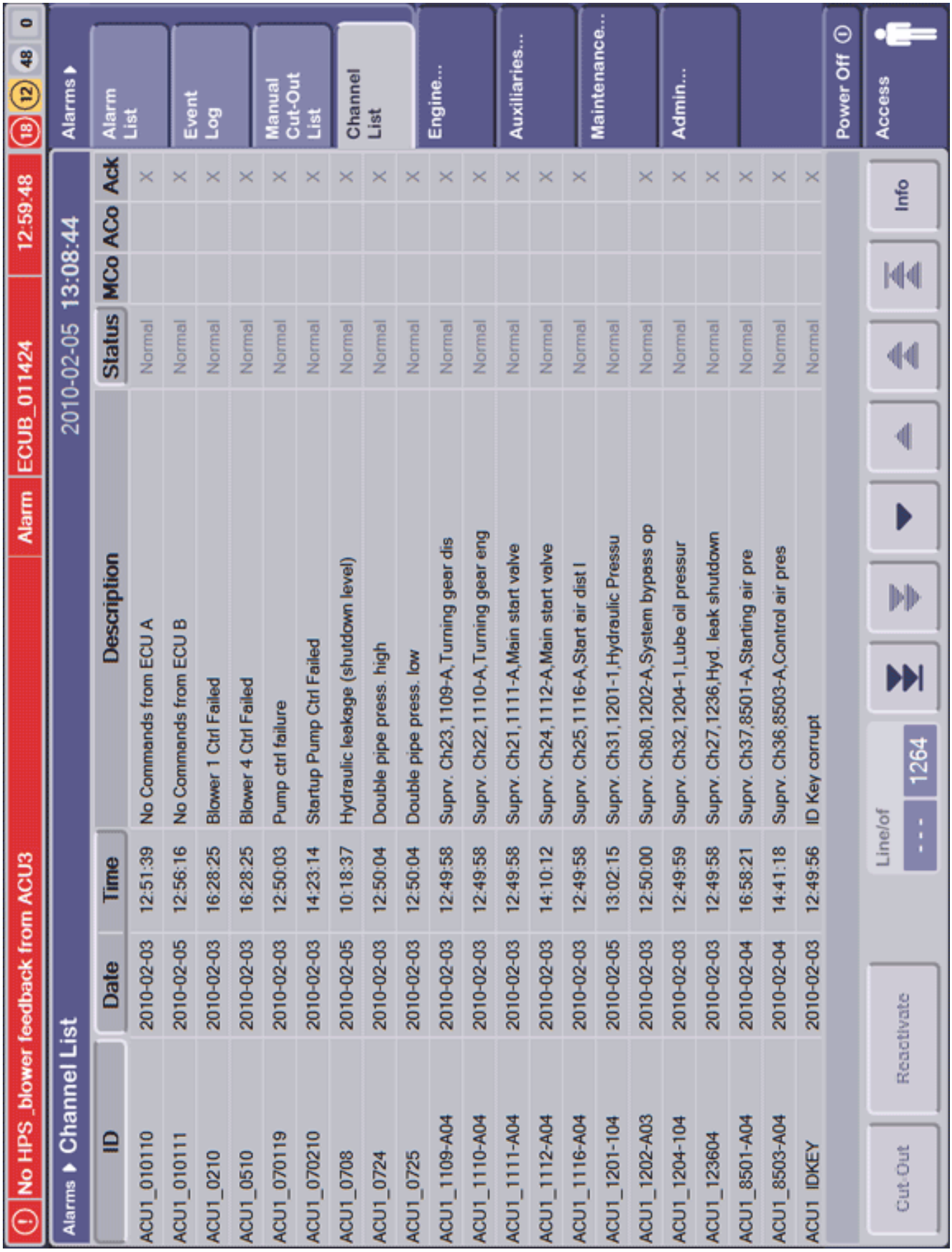

No HPS_blower feedback from ACU3
Alarm
ECUB_011424
12:59:48
18
12
48
0
Alarms ▸ Event Log
2010-02-05 13:04:45
Alarms ▸
ID: Unit_Tag
Date
Time
Description
Status
MCo
ACo
Ack
MOPB_WATCHDOG 2010-02-05 12:38:53,52 Watchdog enabled Event
MOPB_WATCHDOG 2010-02-05 12:38:53,52 pmi_bridge 192.168.0.103 1000 208 209 started. Not su Event
MOPB_WATCHDOG 2010-02-05 12:38:53,52 MainApp started. Not supervised <*> Event
MOPB_WATCHDOG 2010-02-05 12:38:46,55 esysdjob started. Waiting for threads <*> Event
MOPB_WATCHDOG 2010-02-05 12:38:41,04 bes_server 203 - 2 started. Waiting for threads <*> Event
MOPB_WATCHDOG 2010-02-05 12:38:41,04 MOPLock -h -c started. Not supervised <*> Event
MOPB_WATCHDOG 2010-02-05 12:38:40,54 Contact with hardware established Event
MOPB_WATCHDOG 2010-02-05 12:38:36,16 HW Watchdog disabled Event
EICUB_RCSVarAA 2010-02-04 18:38:47,17 RCS communication failure Normal X
EICUB_SMBsTOAI 2010-02-04 18:38:45,54 RCS serial communication fail Normal X
EICUB_0931 2010-02-04 18:38:40,91 FWE-STANDBY-AT_SEA Inconsistency Normal X
EICUB_0660 2010-02-04 18:38:40,90 No Ctrl Station Selected Normal X
EICUB_0158 2010-02-04 18:38:40,89 Lock in Last 'Stop Cmd Bridge' Normal X
EICUB_0156 2010-02-04 18:38:40,89 Lock in Last 'Speed Set Bridge' Normal X
EICUB_0155 2010-02-04 18:38:40,79 Lock in Last 'Slow Down Cmd' Normal X
EICUA_0931 2010-02-04 18:38:40,68 FWE-STANDBY-AT_SEA Inconsistency Normal X
EICUA_0660 2010-02-04 18:38:40,67 No Ctrl Station Selected Normal X
EICUA_0158 2010-02-04 18:38:40,66 Lock in Last 'Stop Cmd Bridge' Normal X
EICUA_0156 2010-02-04 18:38:40,66 Lock in Last 'Speed Set Bridge' Normal X
EICUA_0155 2010-02-04 18:38:40,66 Lock in Last 'Slow Down Cmd' Normal X
Alarm List
Event Log
Manual Cut-Out List
Channel List
Engine...
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Unit/Tag Filter
Time Span Filter
Go to Date/Time
Export...
Info

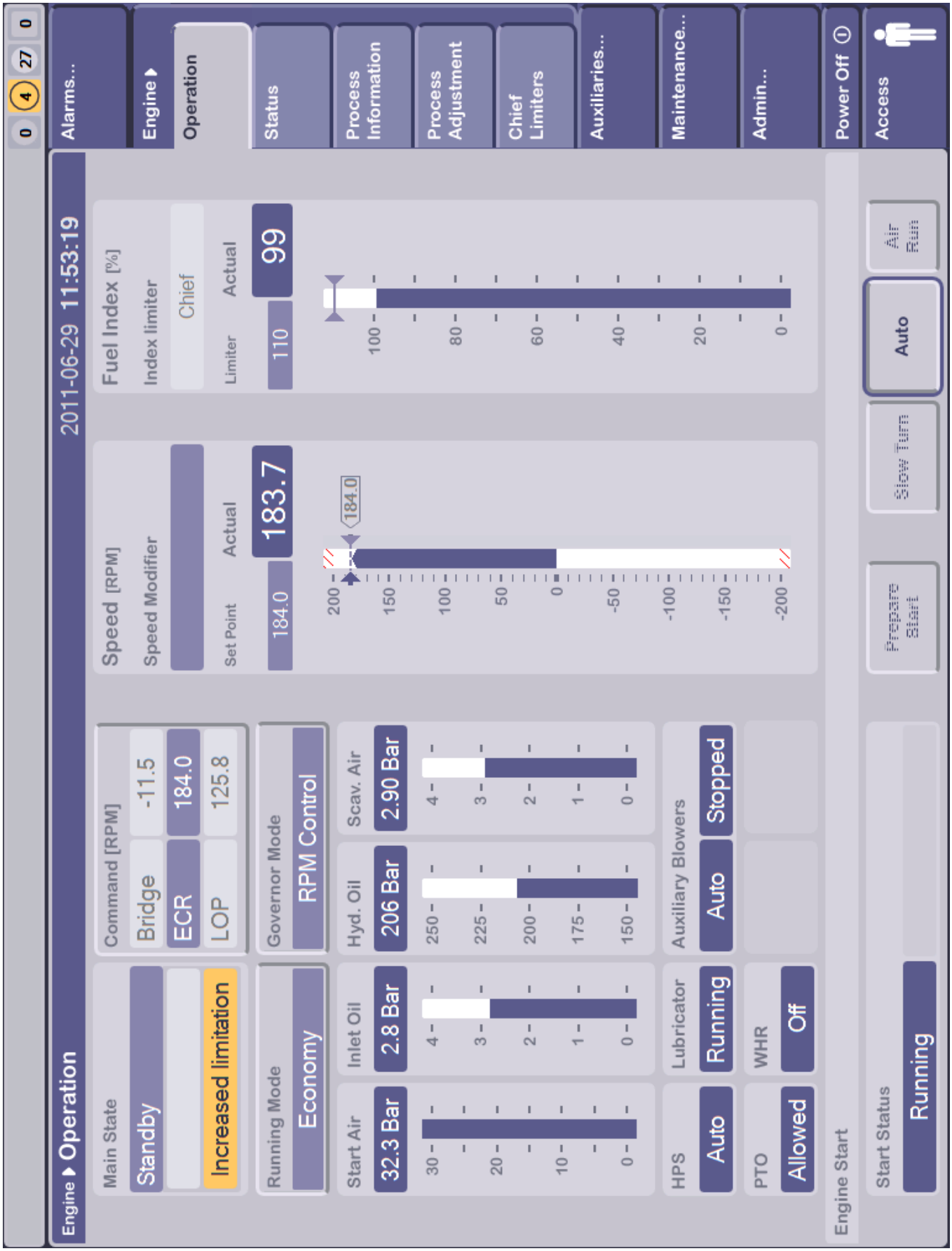

No HPS_blower feedback from ACU3
Alarm
ECUB_011424
12:59:48
Alarms
Event Log
2010-02-05 13:05:52
ID: Unit_Tag
Date
Time
Description
Status
MCo
ACo
Ack
ACU3_IDKEY
2010-02-03
12:49:53,84
ID Key corrupt
Normal
ACU3_SIPF
2010-02-03
12:49:53,83
Invalid Parameter Flash
Normal
CCU5_badBaud
2010-02-03
12:49:53,83
Non standard baud rate
Normal
CCU6_badBaud
2010-02-03
12:49:53,83
Non standard baud rate
Normal
MOPB_WATCHDOG
2010-02-05
12:38:41,04
bes_server 203 - 2 started. Waiting for threads <*>
Event
MOPB_WATCHDOG
2010-02-05
12:38:41,04
MOPLock -h -c started. Not supervised <*>
Event
Unit/Tag Filter
Unit
CCU
Index
Tag
Fetch Selected
Clear
Apply
Alarm List
Event Log
Manual Cut-Out List
Channel List
Engine...
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Unit/Tag Filter
Time Span Filter
Go to Date/Time
Export...
Info

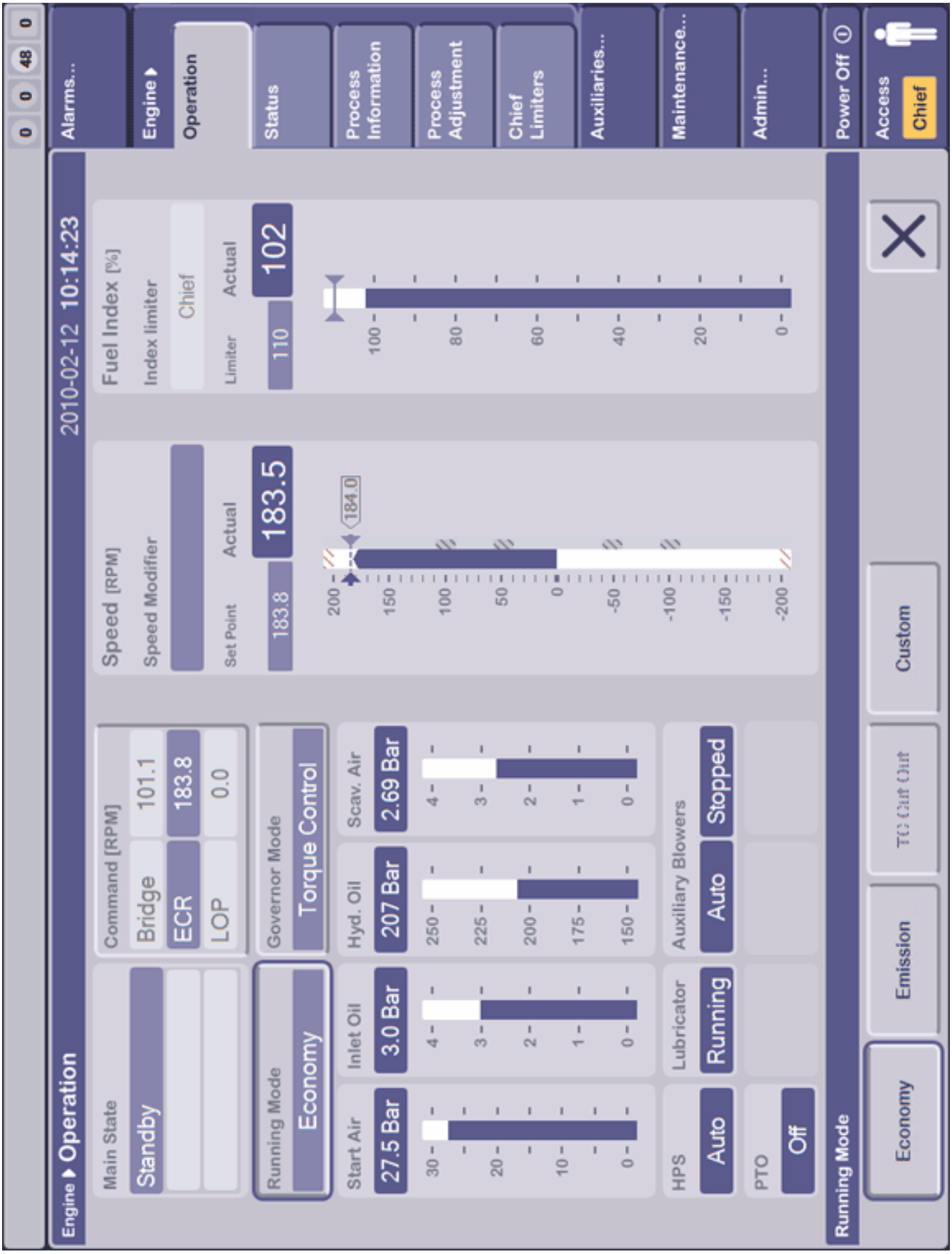

No HPS_blower feedback from ACU3
Alarm
ECUB_011424
12:59:48
Alarms
Event Log
2010-02-05 13:06:48
ID: Unit_Tag
Date
Time
Description
Status
MCo
ACo
Ack
ACU3_IDKEY
2010-02-03
12:49:53,84
ID Key corrupt
Normal
ACU3_SIPF
2010-02-03
12:49:53,83
Invalid Parameter Flash
Normal
CCU5_badBaud
2010-02-03
12:49:53,83
Non standard baud rate
Normal
CCU6_badBaud
2010-02-03
12:49:53,83
Non standard baud rate
Normal
MOPB_WATCHDOG
2010-02-05
12:38:41,04
bes_server 203 - 2 started. Waiting for threads <*>
Event
MOPB_WATCHDOG
2010-02-05
12:38:41,04
MOPLock -h -c started. Not supervised <*>
Event
Time Span Filter
From Date
2010-01-31
From Time
00:00:00
To Date
2100-01-31
To Time
00:00:00
Clear
Apply
yyyy-mm-dd / hh:mm:ss
Alarm List
Event Log
Manual Cut-Out List
Channel List
Engine...
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Unit/Tag Filter
Time Span Filter
Go to Date/Time
Export...
Info

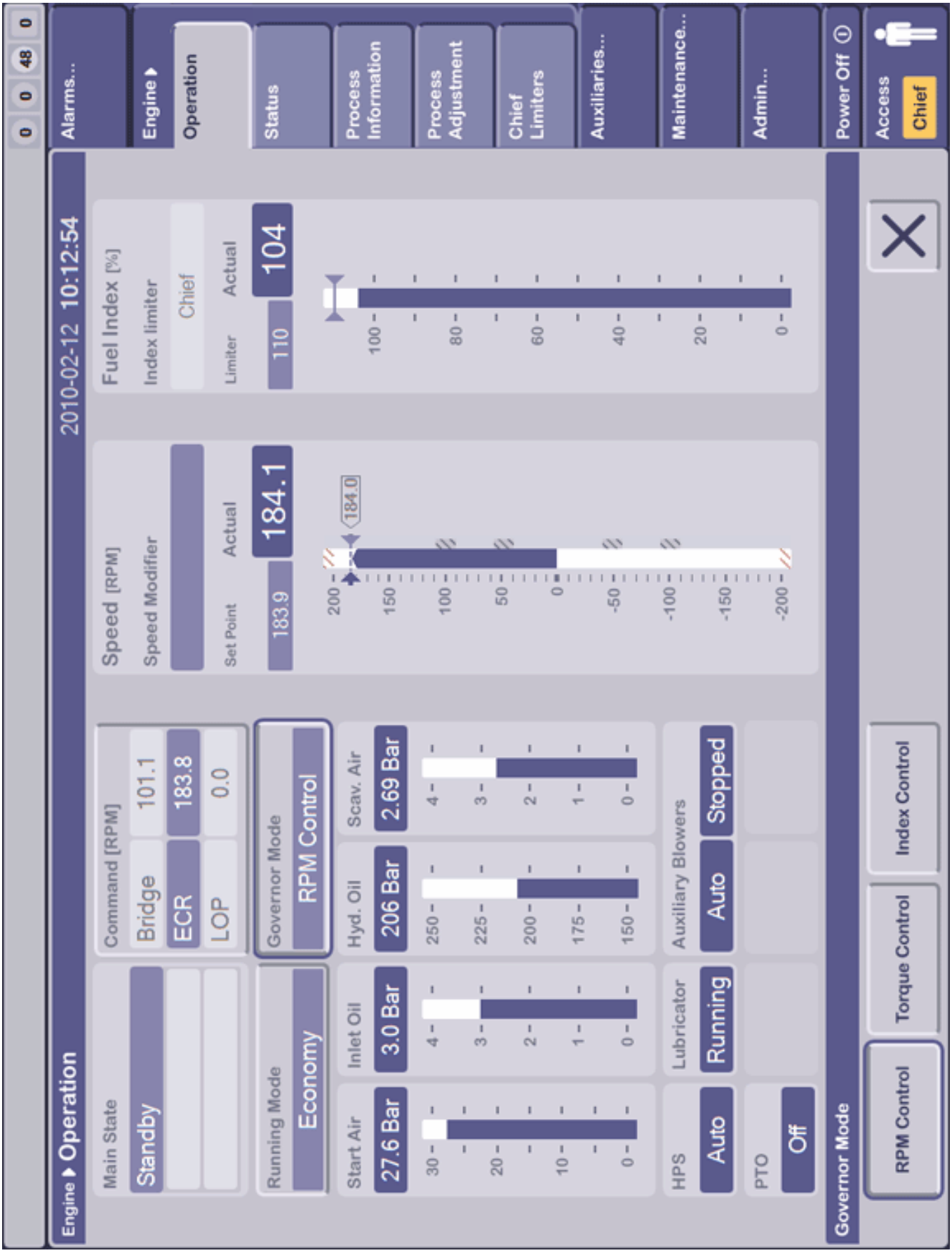

No HPS_blower feedback from ACU3
Alarm
ECUB_011424
12:59:48
18
12
48
0
Alarms
Event Log
2010-02-05 13:07:56
Alarm List
Event Log
Manual Cut-Out List
Channel List
Engine...
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Info
ID: Unit_Tag
Date
Time
Description
Status
MCo
ACo
Ack
ACU3_IDKEY 2010-02-03 12:49:53,84 ID Key corrupt Normal
ACU3_SIPF 2010-02-03 12:49:53,83 Invalid Parameter Flash Normal
CCU5_badBaud 2010-02-03 12:49:53,83 Non standard baud rate Normal
CCU6_badBaud 2010-02-03 12:49:53,83 Non standard baud rate Normal
MOPB_WATCHDOG 2010-02-05 12:38:41,04 bes_server 203 - 2 started. Waiting for threads <*>
MOPB_WATCHDOG 2010-02-05 12:38:41,04 MOPLock -h -c started. Not supervised <*>
Event
Event
Go to Date/Time
Date
2010-01-31
Time
00:00:00
Clear
yyyy-mm-dd / hh:mm:ss
Go to
1 2 3 4 5 6 7 8 9 0 - BS
Q W E R T Y U I O P _
A S D F G H J K L ; :
* Z X C V B N M , . Space
/
Unit/Tag Filter
Time Span Filter
Go to Date/Time
Export...

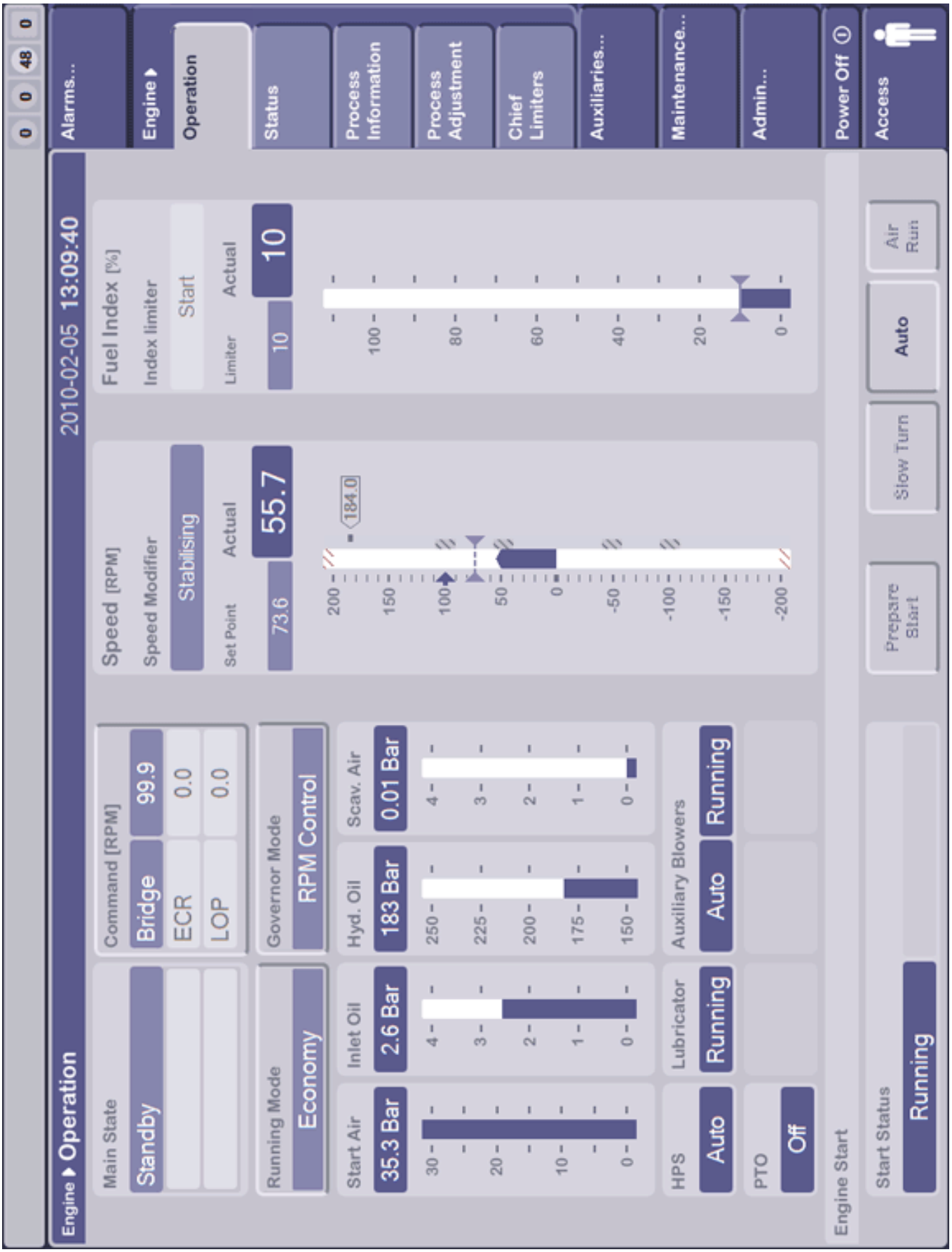

No HPS_blower feedback from ACU3
Alarm
ECUB_011424
12:59:48
18
12
48
0
Alarms ▸ Manual Cut-Out List
2010-02-05 13:08:28
Alarms ▸
Alarm List
Event Log
Manual Cut-Out List
Channel List
Engine...
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
ID Date Time Description Status Limit Current
EICUB_130151 2010-02-05 12:55:13 Cyl 12. No Cylinder lubrication Normal - -
EICUB_130150 2010-02-05 12:55:13 Cyl 11. No Cylinder lubrication Normal - -
EICUB_130149 2010-02-05 12:55:13 Cyl 10. No Cylinder lubrication Normal - -
EICUB_130148 2010-02-05 12:55:13 Cyl 9. No Cylinder lubrication Normal - -
EICUB_130147 2010-02-05 12:55:13 Cyl 8. No Cylinder lubrication Normal - -
EICUB_130145 2010-02-05 12:55:13 Cyl 6. No Cylinder lubrication Normal - -
EICUB_130144 2010-02-05 12:55:13 Cyl 5. No Cylinder lubrication Normal - -
EICUB_130142 2010-02-05 12:55:11 Cyl 3. No Cylinder lubrication Normal - -
EICUB_130143 2010-02-05 12:55:06 Cyl 4. No Cylinder lubrication Normal - -
EICUB_130146 2010-02-05 12:55:06 Cyl 7. No Cylinder lubrication Normal - -
EICUB_SEICU 2010-02-04 18:28:02 Global Params. inconsist Alarm - -
EICUA_SEICU 2010-02-04 18:26:53 Global Params. inconsist Alarm - -
EICUA_130151 2010-02-04 18:25:24 Cyl 12. No Cylinder lubrication Normal - -
EICUA_130150 2010-02-04 18:25:24 Cyl 11. No Cylinder lubrication Normal - -
EICUA_130149 2010-02-04 18:25:24 Cyl 10. No Cylinder lubrication Normal - -
EICUA_130148 2010-02-04 18:25:24 Cyl 9. No Cylinder lubrication Normal - -
EICUA_130147 2010-02-04 18:25:24 Cyl 8. No Cylinder lubrication Normal - -
EICUA_130146 2010-02-04 18:25:24 Cyl 7. No Cylinder lubrication Normal - -
EICUA_130145 2010-02-04 18:25:24 Cyl 6. No Cylinder lubrication Normal - -
Reactivate
Line/of
- - -
48
Info

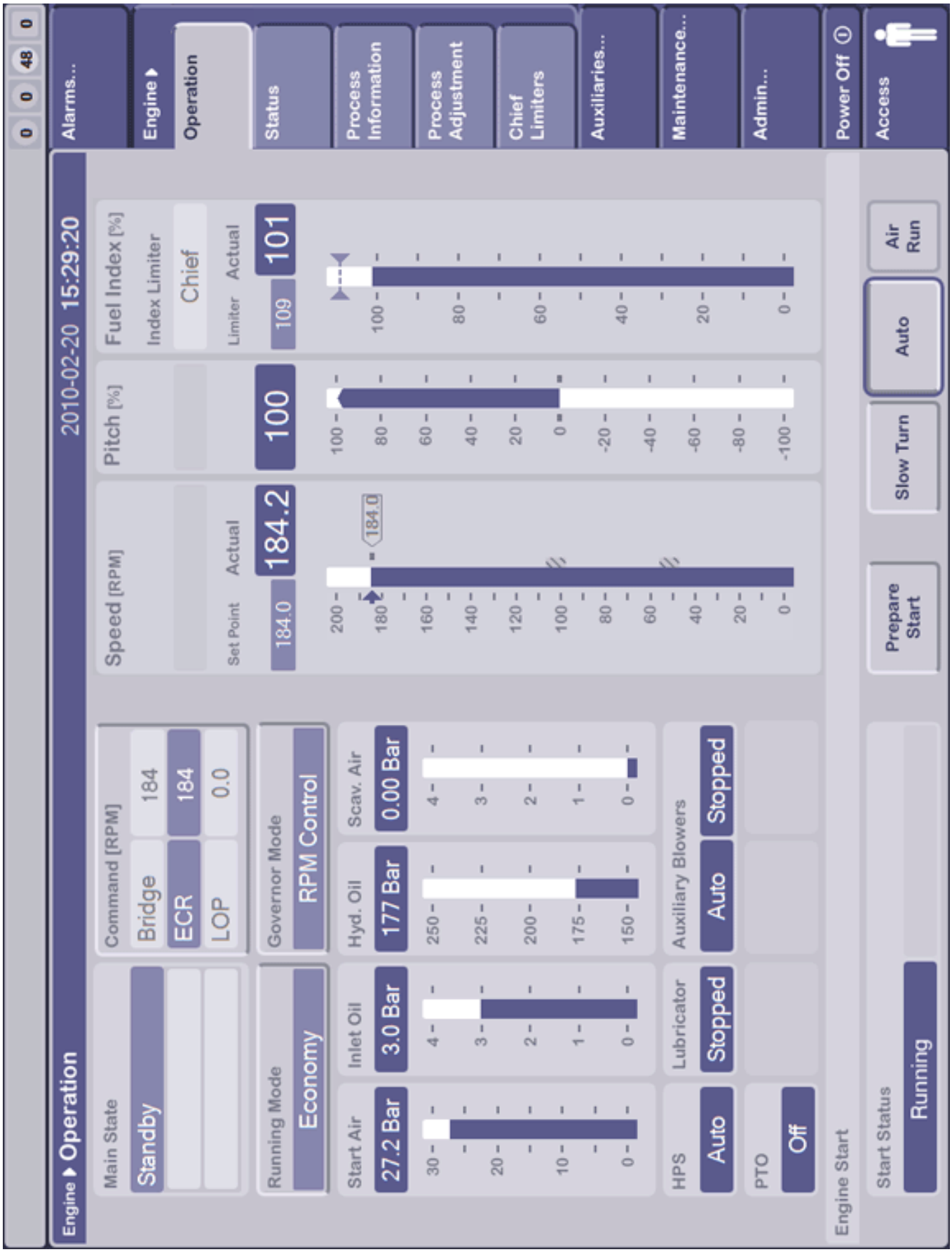

No HPS_blower feedback from ACU3
Alarm
ECUB_011424
12:59:48
18
12
48
0
Alarms ▸ Channel List
2010-02-05 13:08:44
Alarms ▸
Alarm List
Event Log
Manual Cut-Out List
Channel List
Engine...
Auxiliaries...
Maintenance...
Admin...
ID
Date
Time
Description
Status
MCo
ACo
Ack
ACU1_010110 2010-02-03 12:51:39 No Commands from ECU A Normal X
ACU1_010111 2010-02-05 12:56:16 No Commands from ECU B Normal X
ACU1_0210 2010-02-03 16:28:25 Blower 1 Ctrl Failed Normal X
ACU1_0510 2010-02-03 16:28:25 Blower 4 Ctrl Failed Normal X
ACU1_070119 2010-02-03 12:50:03 Pump ctrl failure Normal X
ACU1_070210 2010-02-03 14:23:14 Startup Pump Ctrl Failed Normal X
ACU1_0708 2010-02-05 10:18:37 Hydraulic leakage (shutdown level) Normal X
ACU1_0724 2010-02-03 12:50:04 Double pipe press. high Normal X
ACU1_0725 2010-02-03 12:50:04 Double pipe press. low Normal X
ACU1_1109-A04 2010-02-03 12:49:58 Suprv. Ch23,1109-A,Turning gear dis Normal X
ACU1_1110-A04 2010-02-03 12:49:58 Suprv. Ch22,1110-A,Turning gear eng Normal X
ACU1_1111-A04 2010-02-03 12:49:58 Suprv. Ch21,1111-A,Main start valve Normal X
ACU1_1112-A04 2010-02-03 14:10:12 Suprv. Ch24,1112-A,Main start valve Normal X
ACU1_1116-A04 2010-02-03 12:49:58 Suprv. Ch25,1116-A,Start air dist l Normal X
ACU1_1201-104 2010-02-05 13:02:15 Suprv. Ch31,1201-1,Hydraulic Pressu Normal
ACU1_1202-A03 2010-02-03 12:50:00 Suprv. Ch80,1202-A,System bypass op Normal X
ACU1_1204-104 2010-02-03 12:49:59 Suprv. Ch32,1204-1,Lube oil pressur Normal X
ACU1_123604 2010-02-03 12:49:58 Suprv. Ch27,1236,Hyd. leak shutdown Normal X
ACU1_8501-A04 2010-02-04 16:58:21 Suprv. Ch37,8501-A,Starting air pre Normal X
ACU1_8503-A04 2010-02-04 14:41:18 Suprv. Ch36,8503-A,Control air pres Normal X
ACU1 IDKEY 2010-02-03 12:49:56 ID Key corrupt Normal X
Line/of
- - - 1264
Cut-Out
Reactivate
Info
Power Off
Access

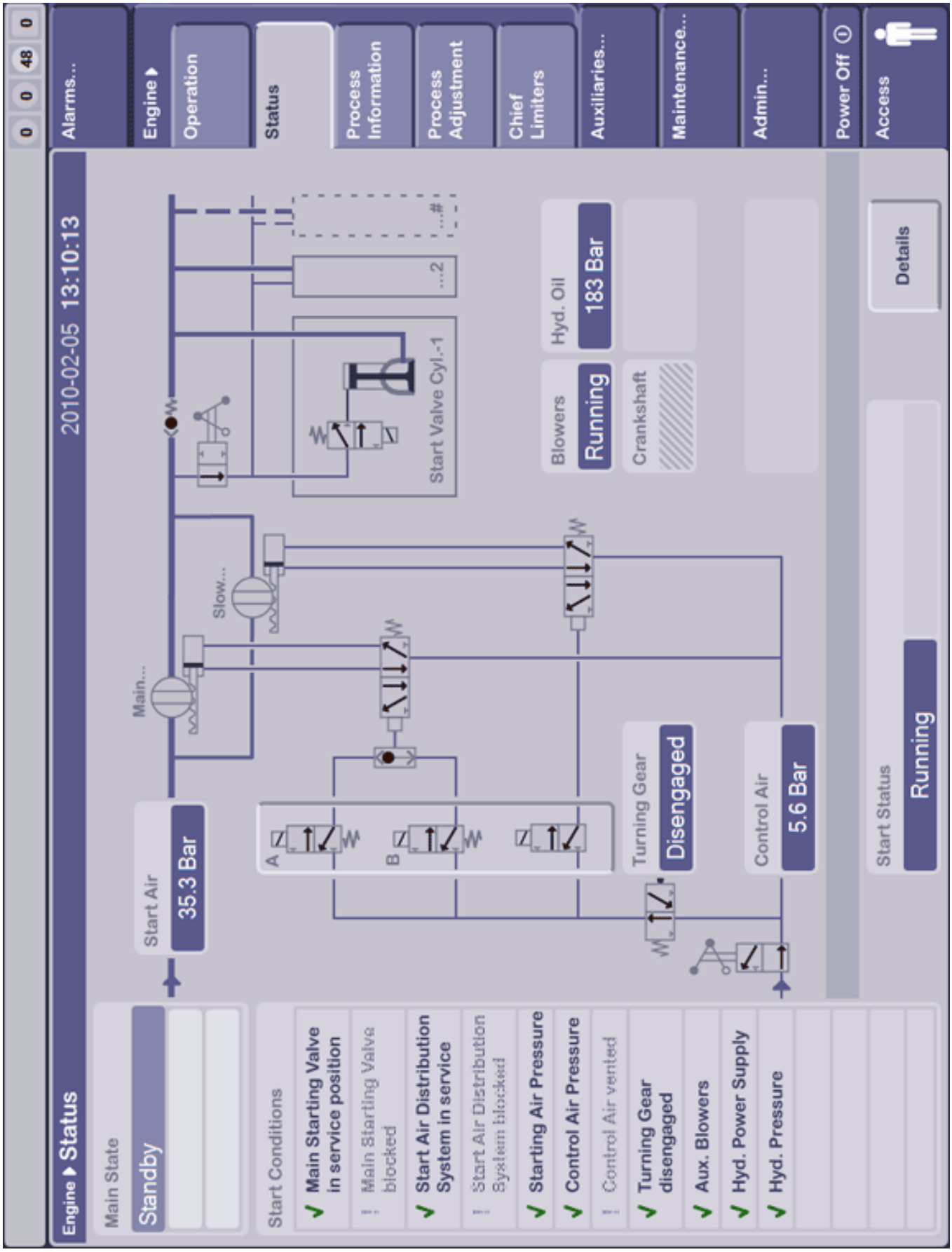

Alarms...
Engine ▸ Operation
2011-06-29 11:53:19
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Main State
Standby
Increased limitation
Command [RPM]
Bridge -11.5
ECR 184.0
LOP 125.8
Governor Mode
RPM Control
Running Mode
Economy
Speed [RPM]
Speed Modifier
Set Point
Actual
184.0
183.7
Fuel Index [%]
Index limiter
Chief
Limiter
Actual
110
99
Start Air
32.3 Bar
Inlet Oil
2.8 Bar
Hyd. Oil
206 Bar
Scav. Air
2.90 Bar
HPS
Auto
Lubricator
Running
Auxiliary Blowers
Auto
Stopped
PTO
Allowed
WHR
Off
Engine Start
Start Status
Running
Prepare Start
Slow Turn
Auto
Air Run

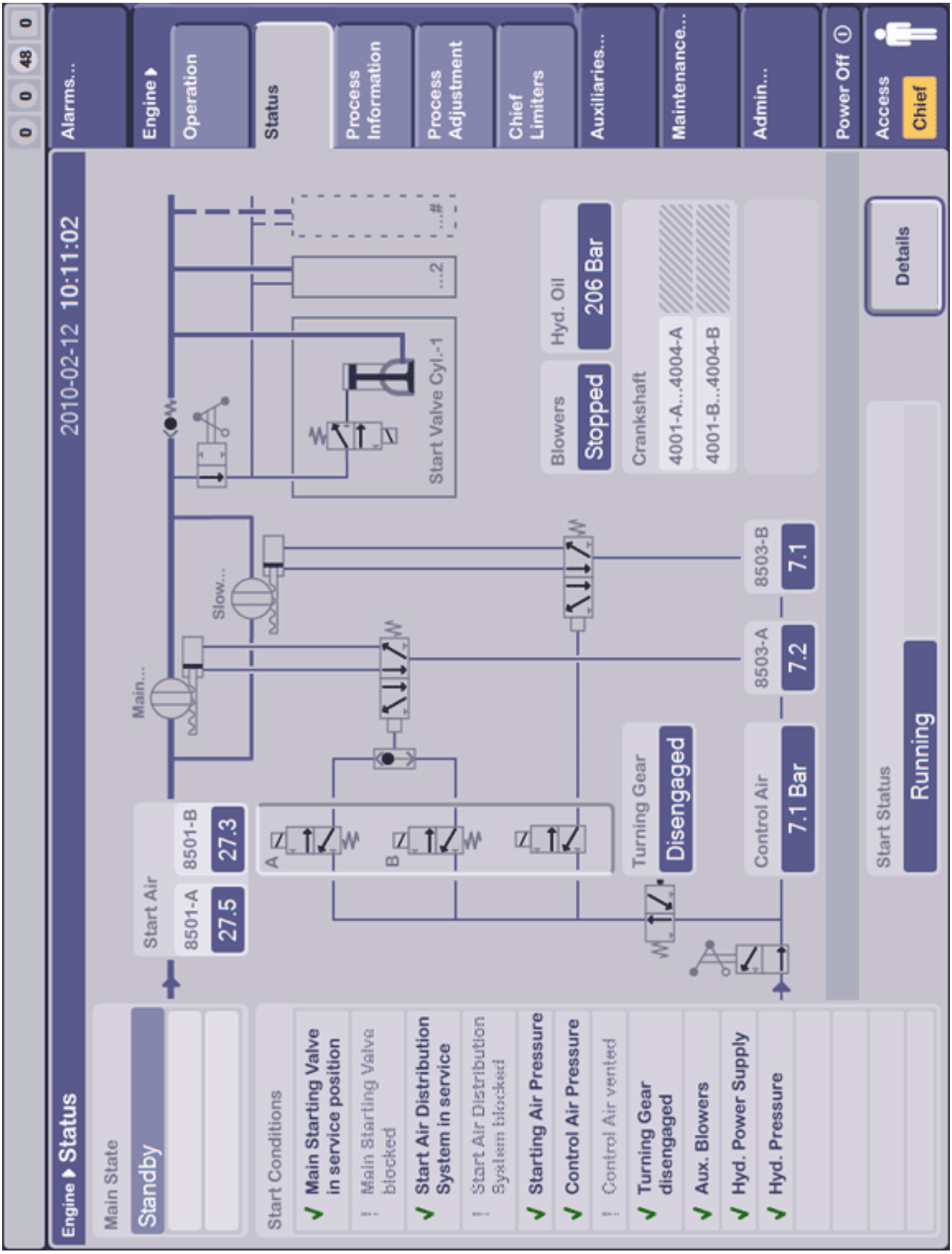

Alarms...
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Chief
Engine ▸ Operation
2010-02-12 10:14:23
Main State
Standby
Command [RPM]
Bridge 101.1
ECR 183.8
LOP 0.0
Running Mode
Economy
Governor Mode
Torque Control
Speed [RPM]
Speed Modifier
Set Point
183.8
Actual
183.5
184.0
Fuel Index [%]
Index limiter
Chief
Limiter
Actual
110
102
Start Air
27.5 Bar
Inlet Oil
3.0 Bar
Hyd. Oil
207 Bar
Scav. Air
2.69 Bar
HPS
Auto
Lubricator
Running
Auxiliary Blowers
Auto
Stopped
PTO
Off
Running Mode
Economy
Emission
Custom

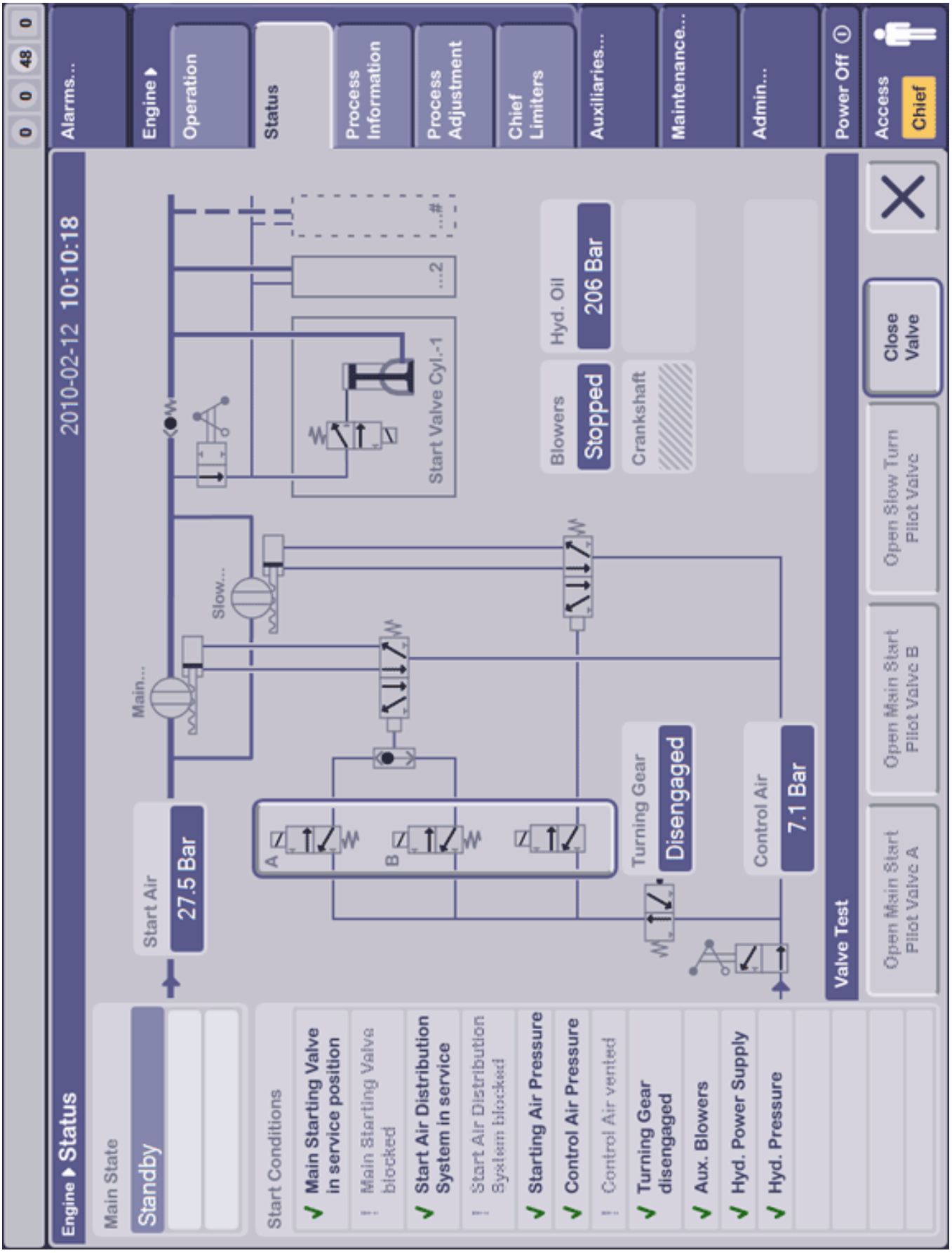

Alarms...
Engine
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Chief
Engine ▸ Operation
2010-02-12 10:12:54
Main State
Standby
Command [RPM]
Bridge 101.1
ECR 183.8
LOP 0.0
Running Mode
Economy
Governor Mode
RPM Control
Speed [RPM]
Speed Modifier
Set Point
183.9
Actual
184.1
184.0
Fuel Index [%]
Index limiter
Chief
Limiter
110
Actual
104
Start Air
27.6 Bar
Inlet Oil
3.0 Bar
Hyd. Oil
206 Bar
Scav. Air
2.69 Bar
HPS
Auto
Lubricator
Running
Auxiliary Blowers
Auto
Stopped
PTO
Off
Governor Mode
RPM Control
Torque Control
Index Control


Alarms...
Engine
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Engine ▸ Operation
2010-02-05 13:09:40
Main State
Standby
Command [RPM]
Bridge
99.9
ECR
0.0
LOP
0.0
Running Mode
Economy
Governor Mode
RPM Control
Speed [RPM]
Speed Modifier
Stabilising
Set Point
Actual
73.6
55.7
184.0
Fuel Index [%]
Index limiter
Start
Limiter
Actual
10
10
Start Air
35.3 Bar
Inlet Oil
2.6 Bar
Hyd. Oil
183 Bar
Scav. Air
0.01 Bar
HPS
Auto
Lubricator
Running
Auxiliary Blowers
Auto
Running
PTO
Off
Engine Start
Start Status
Running
Prepare Start
Slow Turn
Auto
Air Run

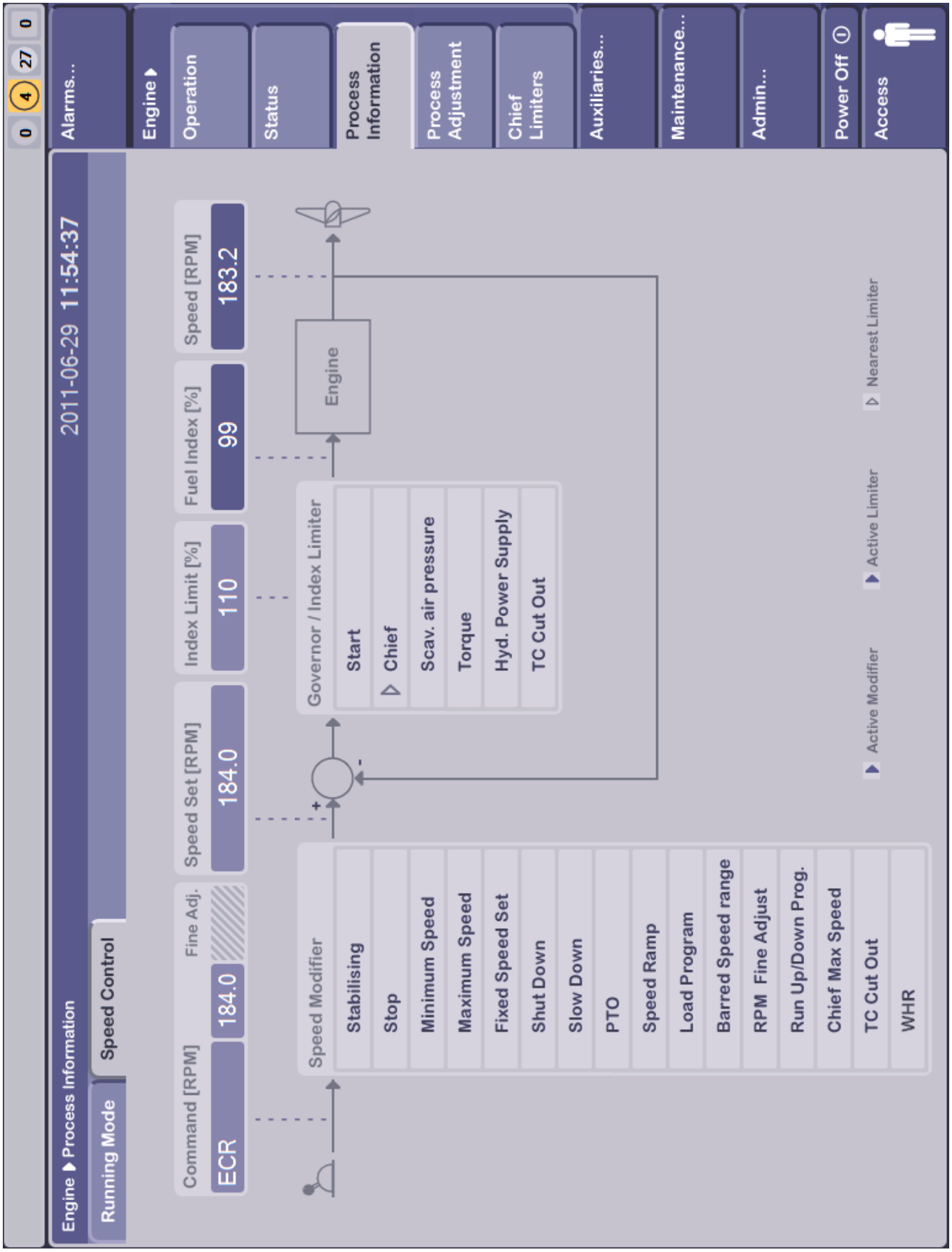

0 0 48 0
Alarms...
Engine ▸ Operation
2010-02-20 15:29:20
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Main State
Standby
Command [RPM]
Bridge 184
ECR 184
LOP 0.0
Speed [RPM]
Set Point 184.0
Actual 184.2
Pitch [%]
100
Fuel Index [%]
Index Limiter Chief
Limiter Actual 109 101
Running Mode
Economy
Governor Mode
RPM Control
Start Air
27.2 Bar
Inlet Oil
3.0 Bar
Hyd. Oil
177 Bar
Scav. Air
0.00 Bar
HPS
Auto
Lubricator
Stopped
Auxiliary Blowers
Auto
Stopped
PTO
Off
Engine Start
Start Status
Running
Prepare Start
Slow Turn
Auto
Air Run

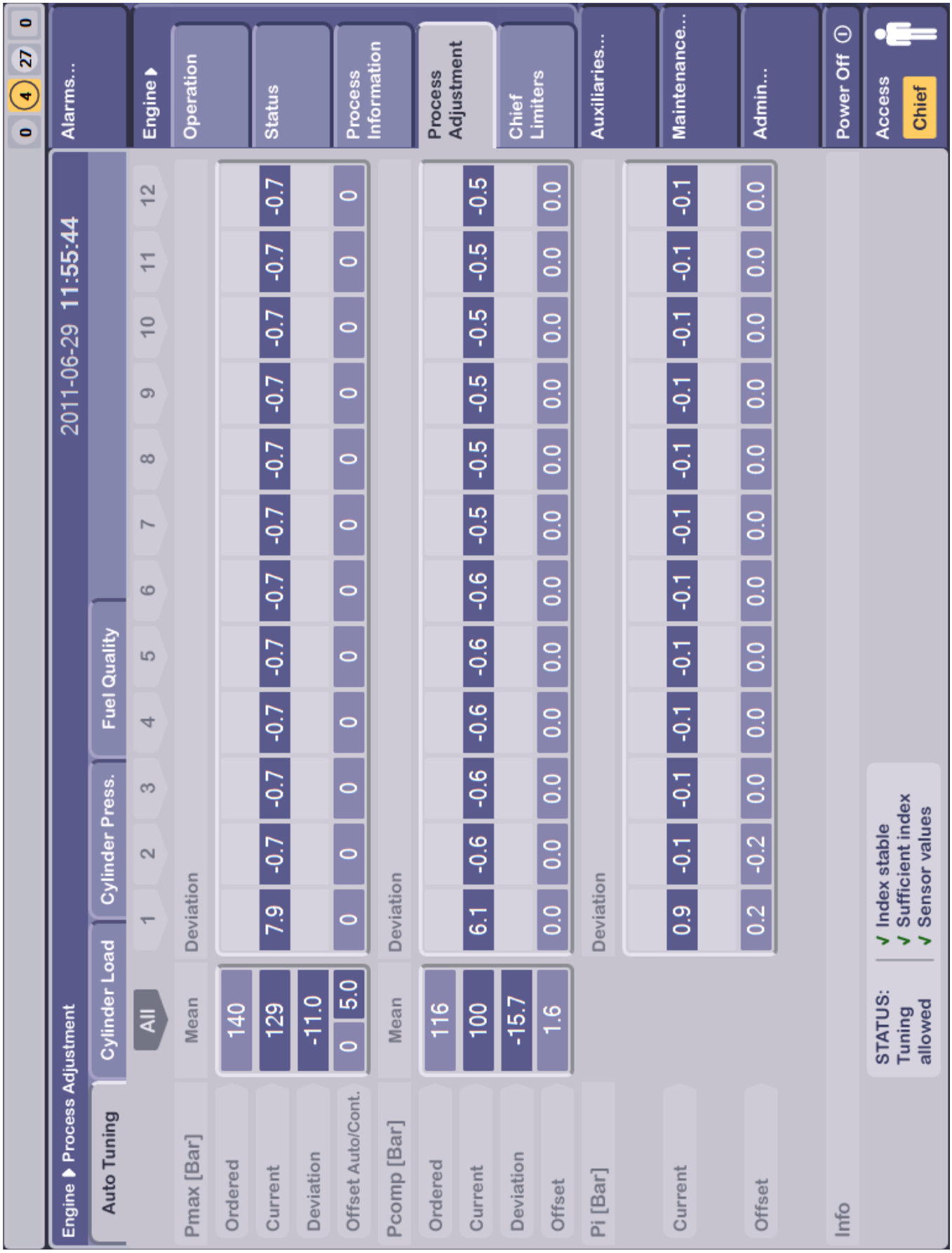

Alarms...
Engine
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Engine ▸ Status
2010-02-05 13:10:13
Main State
Standby
Start Conditions
Main Starting Valve in service position
Main Starting Valve blocked
Start Air Distribution System in service
Start Air Distribution System blocked
Starting Air Pressure
Control Air Pressure
Control Air vented
Turning Gear disengaged
Aux. Blowers
Hyd. Power Supply
Hyd. Pressure
Start Air
35.3 Bar
Main...
Slow...
A
B
Start Valve Cyl.-1
Turning Gear
Disengaged
Control Air
5.6 Bar
Blowers
Running
Hyd. Oil
183 Bar
Crankshaft
Start Status
Running
Details


Alarms...
Engine
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Chief
2010-02-12 10:11:02
Engine ▸ Status
Main State
Standby
Start Conditions
Main Starting Valve in service position
Main Starting Valve blocked
Start Air Distribution System in service
Start Air Distribution System blocked
Starting Air Pressure
Control Air Pressure
Control Air vented
Turning Gear disengaged
Aux. Blowers
Hyd. Power Supply
Hyd. Pressure
Start Air
8501-A
27.5
8501-B
27.3
Main...
Slow...
A
B
Start Valve Cyl.-1
...2
...#
Turning Gear
Disengaged
Control Air
7.1 Bar
8503-A
7.2
8503-B
7.1
Blowers
Stopped
Hyd. Oil
206 Bar
Crankshaft
4001-A...4004-A
4001-B...4004-B
Start Status
Running
Details

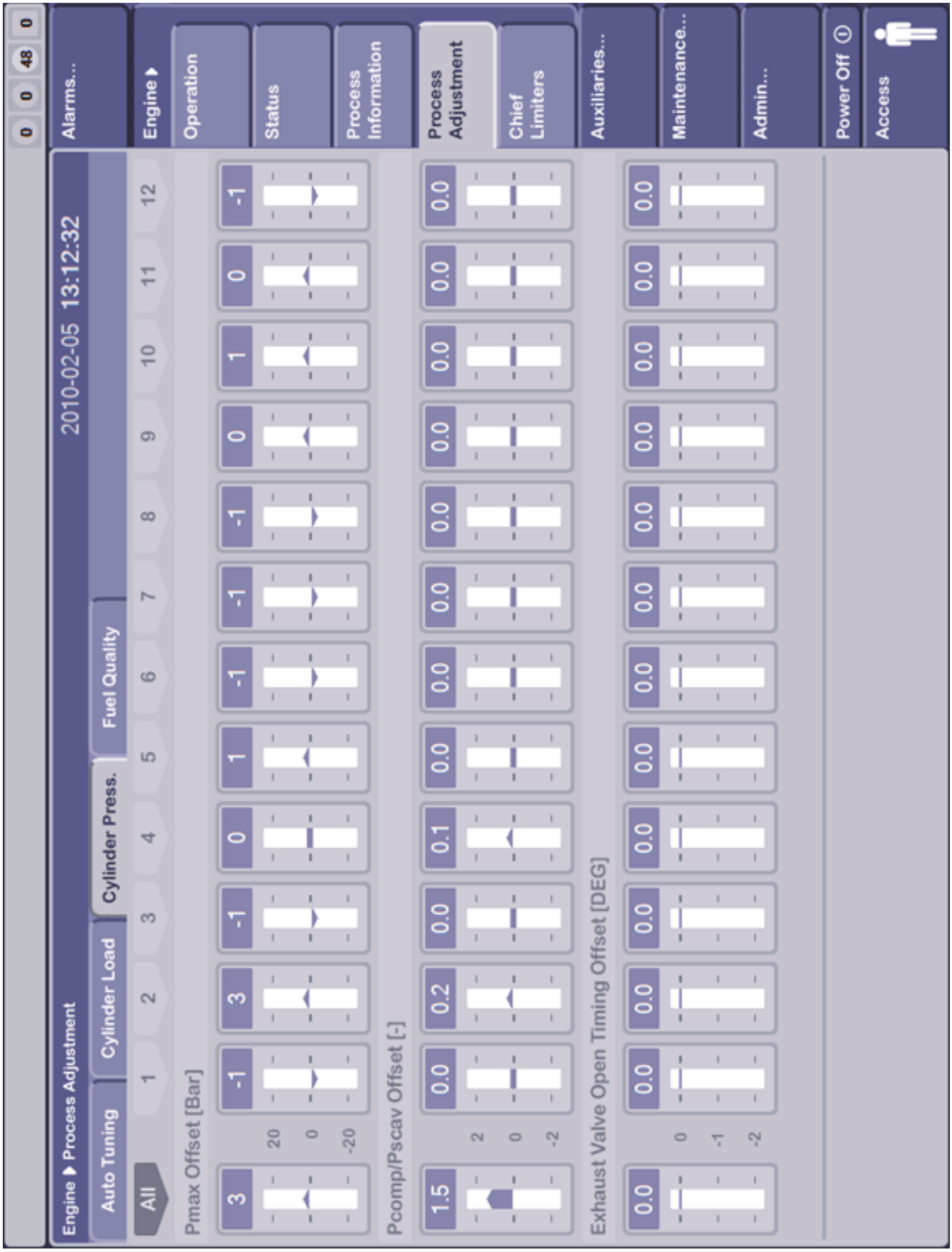

0 0 48 0
Alarms...
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Chief
Engine ▸ Status
2010-02-12 10:10:18
Main State
Standby
Start Conditions
Main Starting Valve in service position
Main Starting Valve blocked
Start Air Distribution System in service
Start Air Distribution System blocked
Starting Air Pressure
Control Air Pressure
Control Air vented
Turning Gear disengaged
Aux. Blowers
Hyd. Power Supply
Hyd. Pressure
Start Air
27.5 Bar
Main...
Slow...
A
B
Start Valve Cyl.-1
...2
...#
Turning Gear
Disengaged
Control Air
7.1 Bar
Blowers
Stopped
Hyd. Oil
206 Bar
Crankshaft
Valve Test
Open Main Start Pilot Valve A
Open Main Start Pilot Valve B
Open Slow Turn Pilot Valve
Close Valve

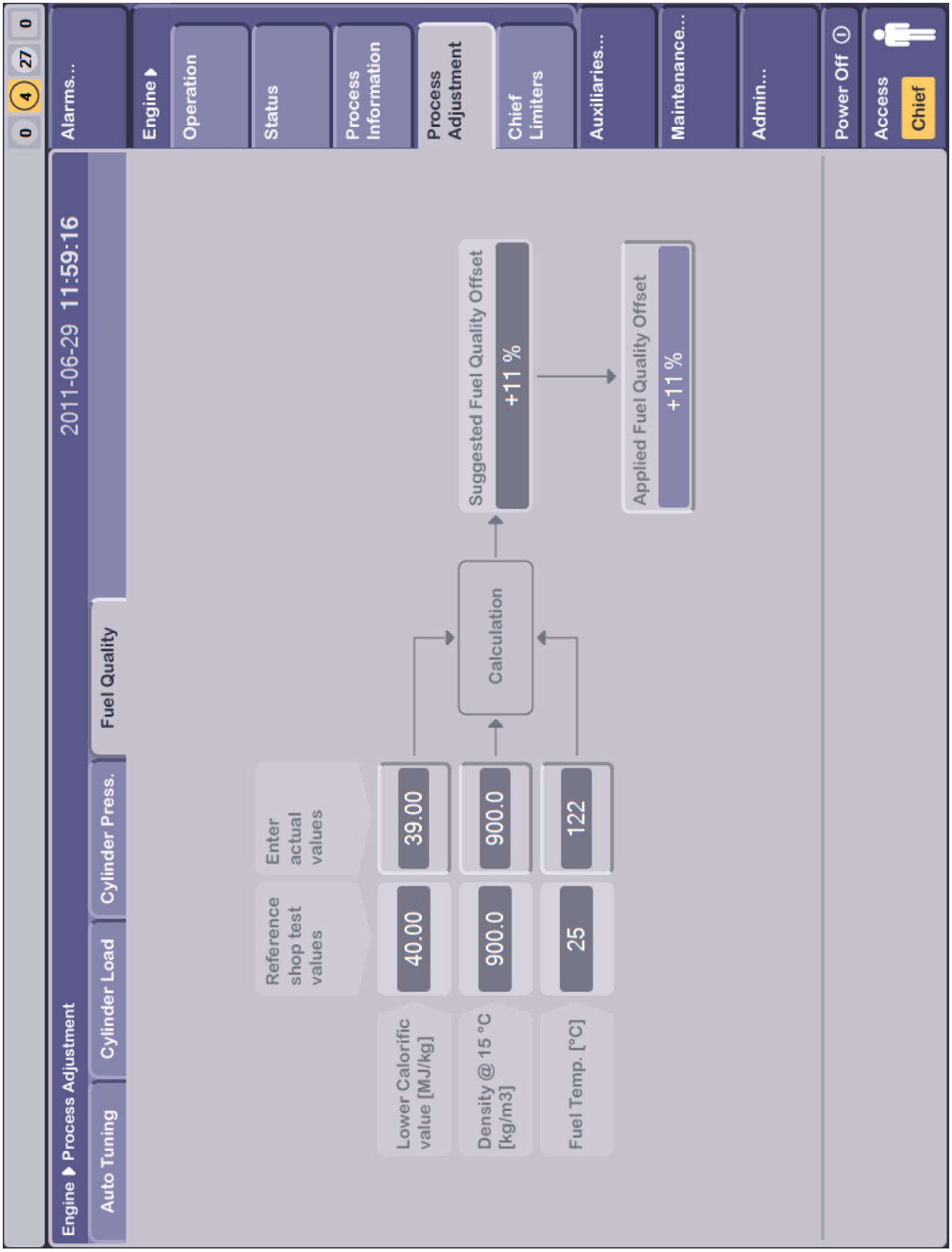

0
0
48
0
Alarms...
Engine
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Chief
Engine ▶ Process Information
2010-02-12 10:08:59
Running Mode
Speed Control
Speed Actual [RPM]
184.6
Speed Set Point [RPM]
183.8
Fuel Index Set Point
103 %
Hyd. Oil Actual
207 Bar
Hyd. Oil Set Point
207 Bar
Pscav Actual
2.69 Bar
Pscav Set Point
2.93 Bar
Running Mode
Economy
Estimated Engine Load
100 %
Maximum Pressure
140 Bar
Compression Pressure
130 Bar
Pcomp/Pscav
35.5
Exh. Valve Open Timing
110.9 °ATDC
Running Mode
Economy
Emission
TC Cut Out
Custom

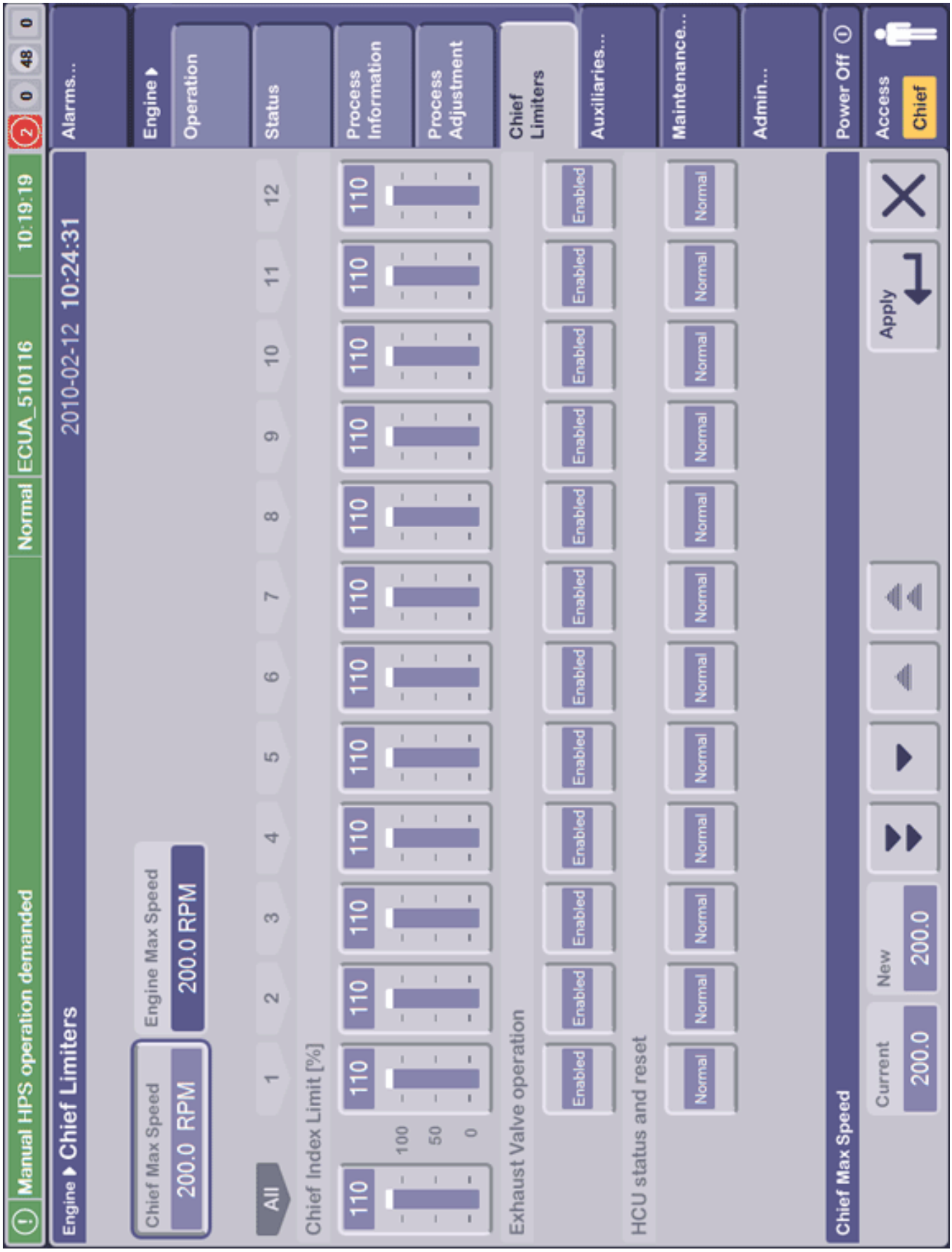

0 4 27 0
Alarms...
Engine ▸ Process Information
2011-06-29 11:54:37
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Running Mode
Speed Control
Command [RPM]
Fine Adj.
ECR
184.0
Speed Set [RPM]
184.0
Index Limit [%]
110
Fuel Index [%]
99
Speed [RPM]
183.2
Speed Modifier
Stabilising
Stop
Minimum Speed
Maximum Speed
Fixed Speed Set
Shut Down
Slow Down
PTO
Speed Ramp
Load Program
Barred Speed range
RPM Fine Adjust
Run Up/Down Prog.
Chief Max Speed
TC Cut Out
WHR
Governor / Index Limiter
Start
Chief
Scav. air pressure
Torque
Hyd. Power Supply
TC Cut Out
Engine
+
-
Active Modifier
Active Limiter
Nearest Limiter

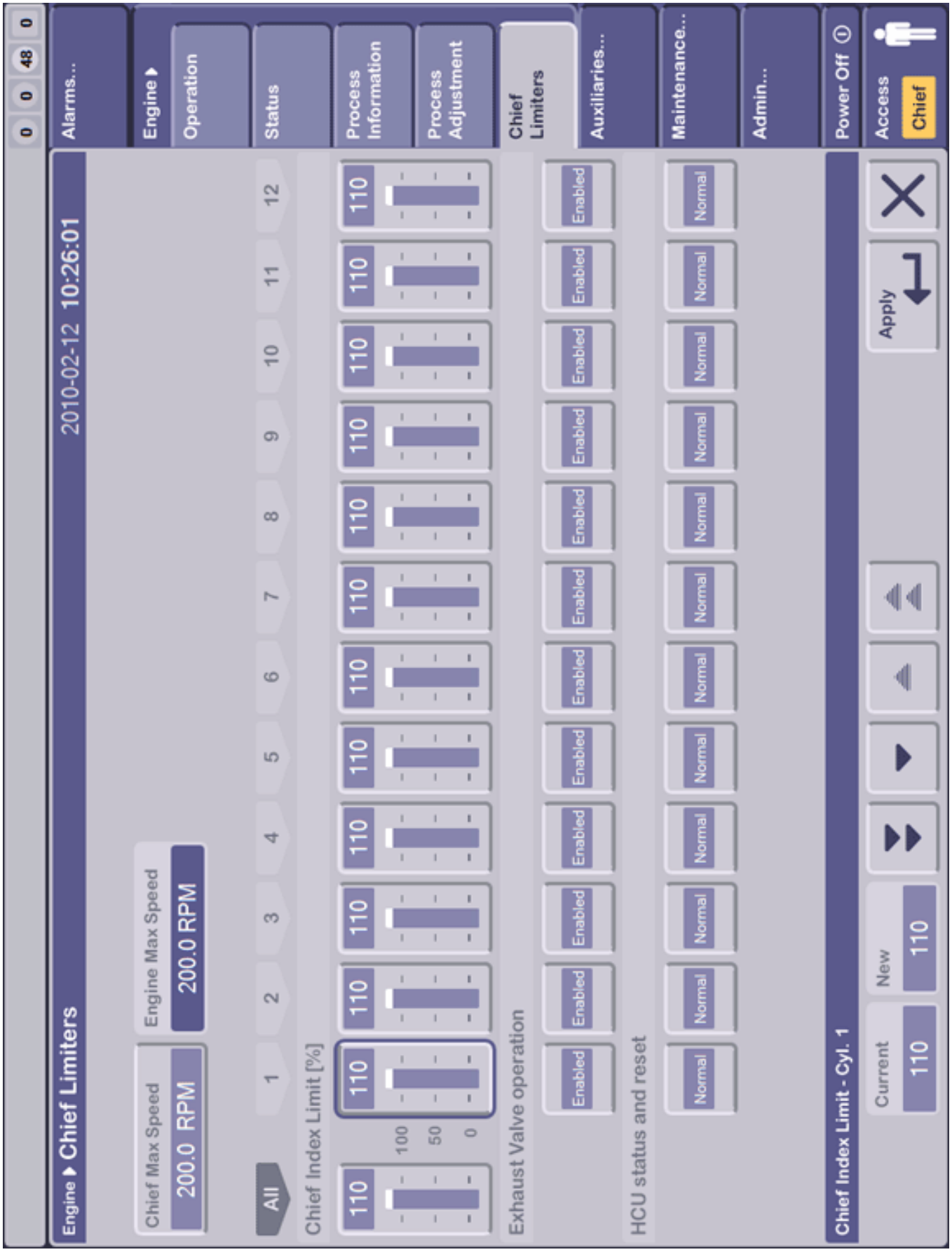

0 4 27 0
Alarms...
Engine ▸ Process Adjustment
2011-06-29 11:55:44
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Chief
Auto Tuning
Cylinder Load
Cylinder Press.
Fuel Quality
All
1 2 3 4 5 6 7 8 9 10 11 12
Pmax [Bar]
Mean
Deviation
Ordered 140
Current 129 7.9 -0.7 -0.7 -0.7 -0.7 -0.7 -0.7 -0.7 -0.7 -0.7 -0.7 -0.7
Deviation -11.0
Offset Auto/Cont. 0 5.0 0 0 0 0 0 0 0 0 0 0 0 0
Pcomp [Bar]
Mean
Deviation
Ordered 116
Current 100 6.1 -0.6 -0.6 -0.6 -0.6 -0.6 -0.5 -0.5 -0.5 -0.5 -0.5 -0.5
Deviation -15.7
Offset 1.6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
Pi [Bar]
Deviation
Current 0.9 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1 -0.1
Offset 0.2 -0.2 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
Info
STATUS: Tuning allowed
✓ Index stable
✓ Sufficient index
✓ Sensor values

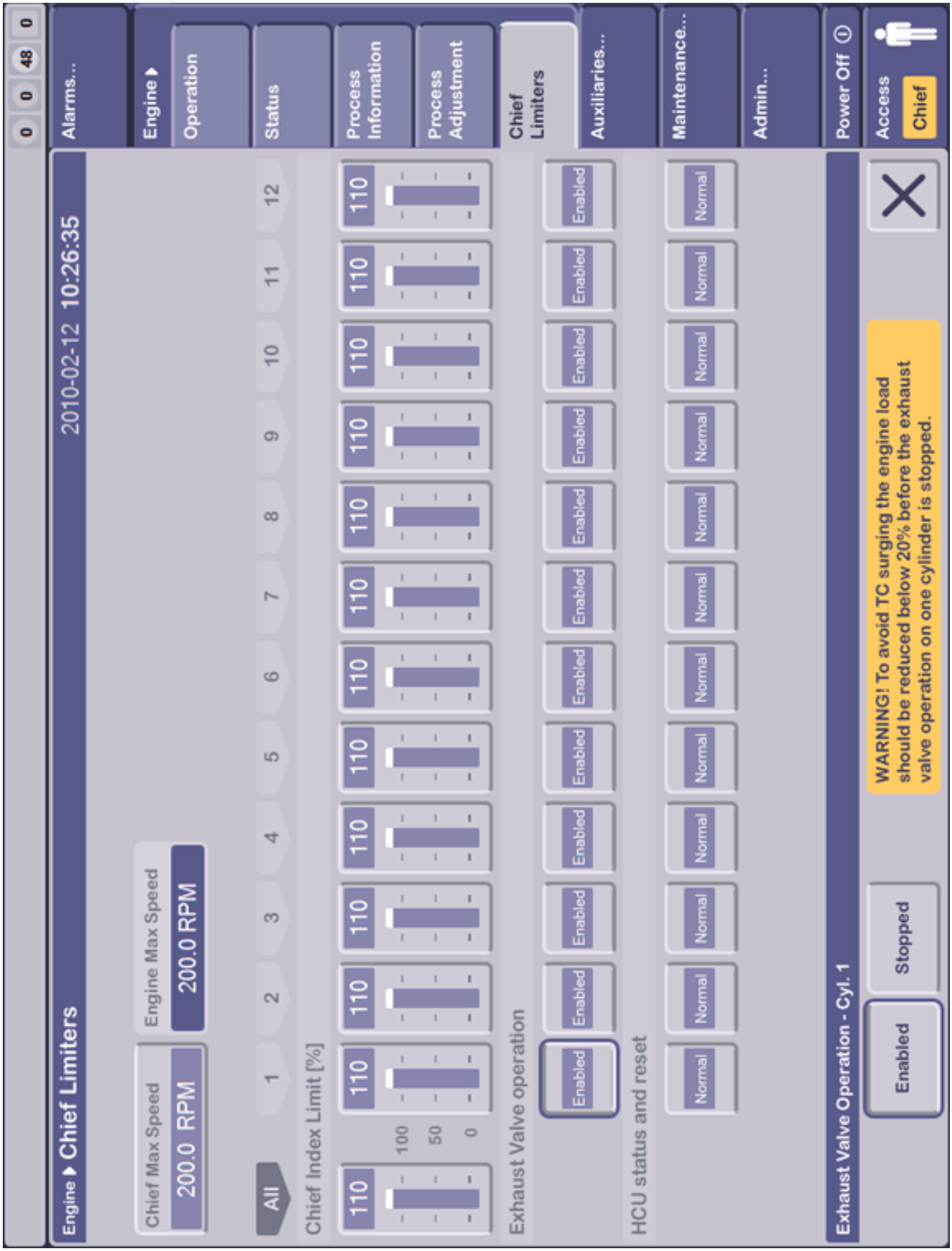

0 0 48 0
Alarms...
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Engine ▸ Process Adjustment
2010-02-05 13:12:13
Auto Tuning
Cylinder Load
Cylinder Press.
Fuel Quality
1 2 3 4 5 6 7 8 9 10 11 12
High Load Offset [%]
10
0
-10
-1 1 0 0 0 0 0 0 0 0 0 0
Low Load Offset [%]
5
0
-5
0 0 0 0 0 0 0 0 0 0 0 0

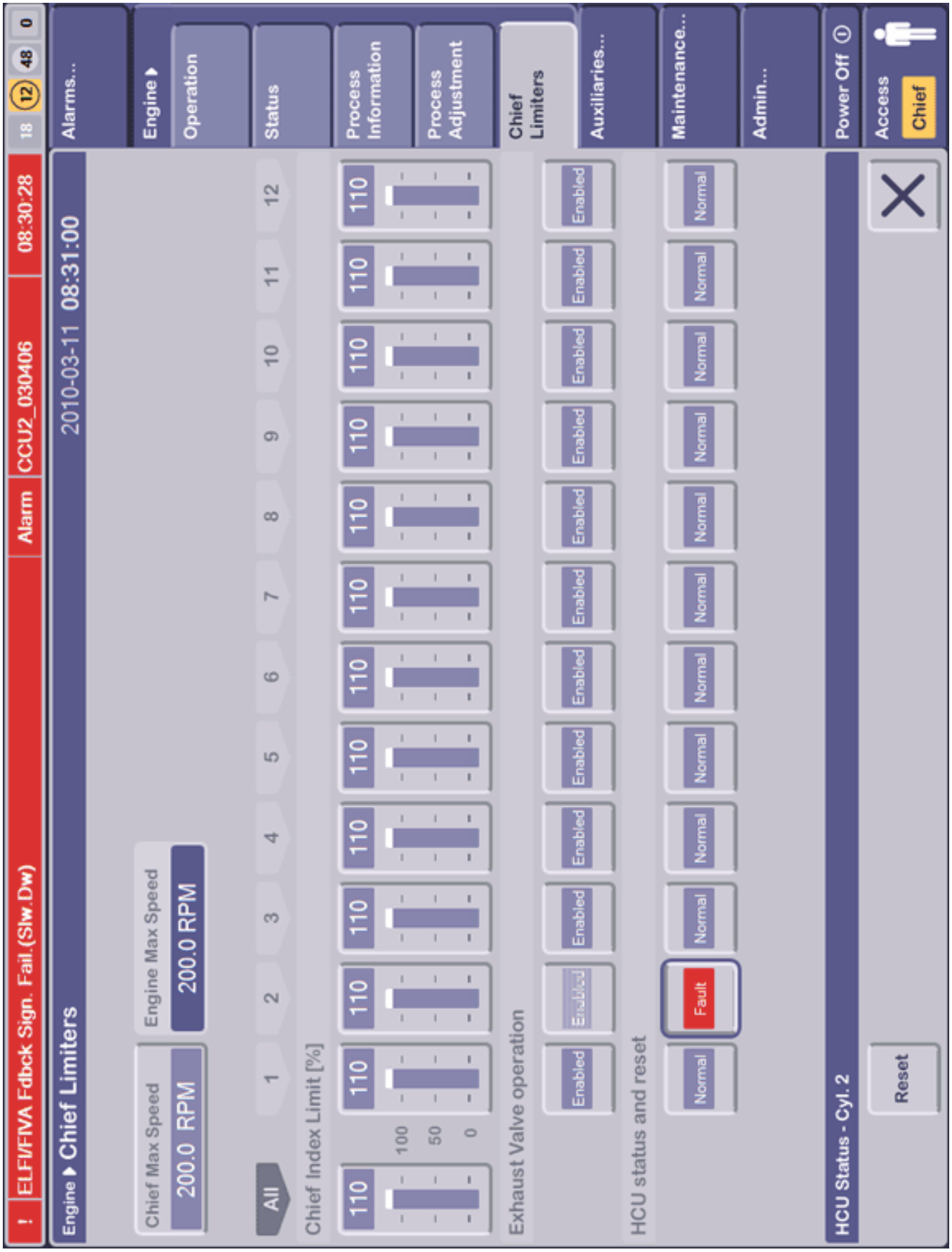

Alarms...
0 0 48 0
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Engine ▸ Process Adjustment
2010-02-05 13:12:32
Auto Tuning
Cylinder Load
Cylinder Press.
Fuel Quality
All
1 2 3 4 5 6 7 8 9 10 11 12
Pmax Offset [Bar]
Pcomp/Pscav Offset [-]
Exhaust Valve Open Timing Offset [DEG]

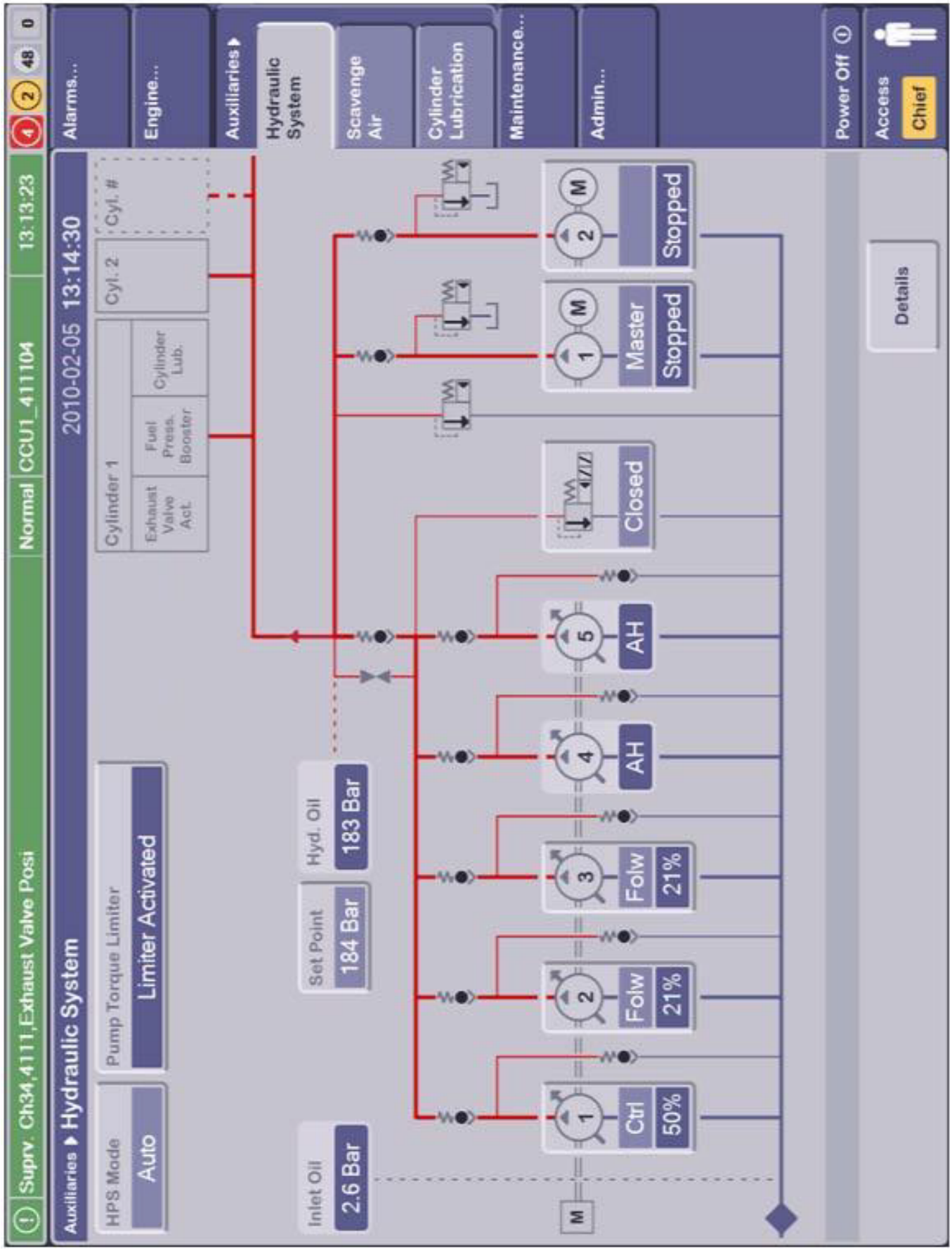

0 4 27 0
Alarms...
Engine
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Chief
2011-06-29 11:59:16
Engine ▸ Process Adjustment
Auto Tuning
Cylinder Load
Cylinder Press.
Fuel Quality
Reference shop test values
Enter actual values
Lower Calorific value [MJ/kg]
40.00
39.00
Density @ 15 °C [kg/m3]
900.0
900.0
Fuel Temp. [°C]
25
122
Calculation
Suggested Fuel Quality Offset
+11 %
Applied Fuel Quality Offset
+11 %

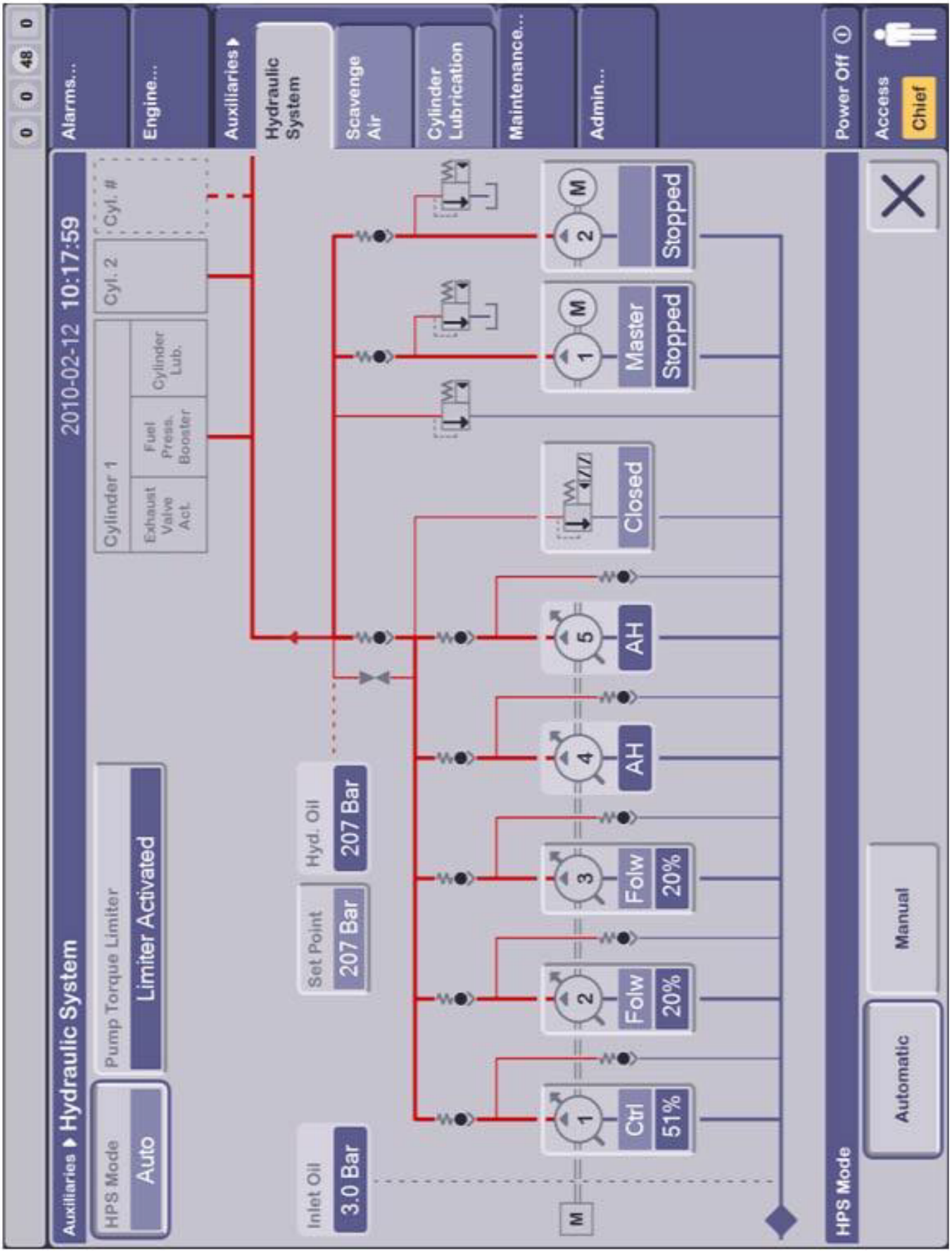

Manual HPS operation demanded
Normal
ECUA_510116
10:19:19
2
0
48
0
Alarms...
Engine ▸ Chief Limiters
2010-02-12 10:24:31
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Chief
Chief Max Speed
200.0 RPM
Engine Max Speed
200.0 RPM
All
1 2 3 4 5 6 7 8 9 10 11 12
Chief Index Limit [%]
100
50
0
110
Exhaust Valve operation
Enabled
HCU status and reset
Normal
Chief Max Speed
Current
200.0
New
200.0
Apply

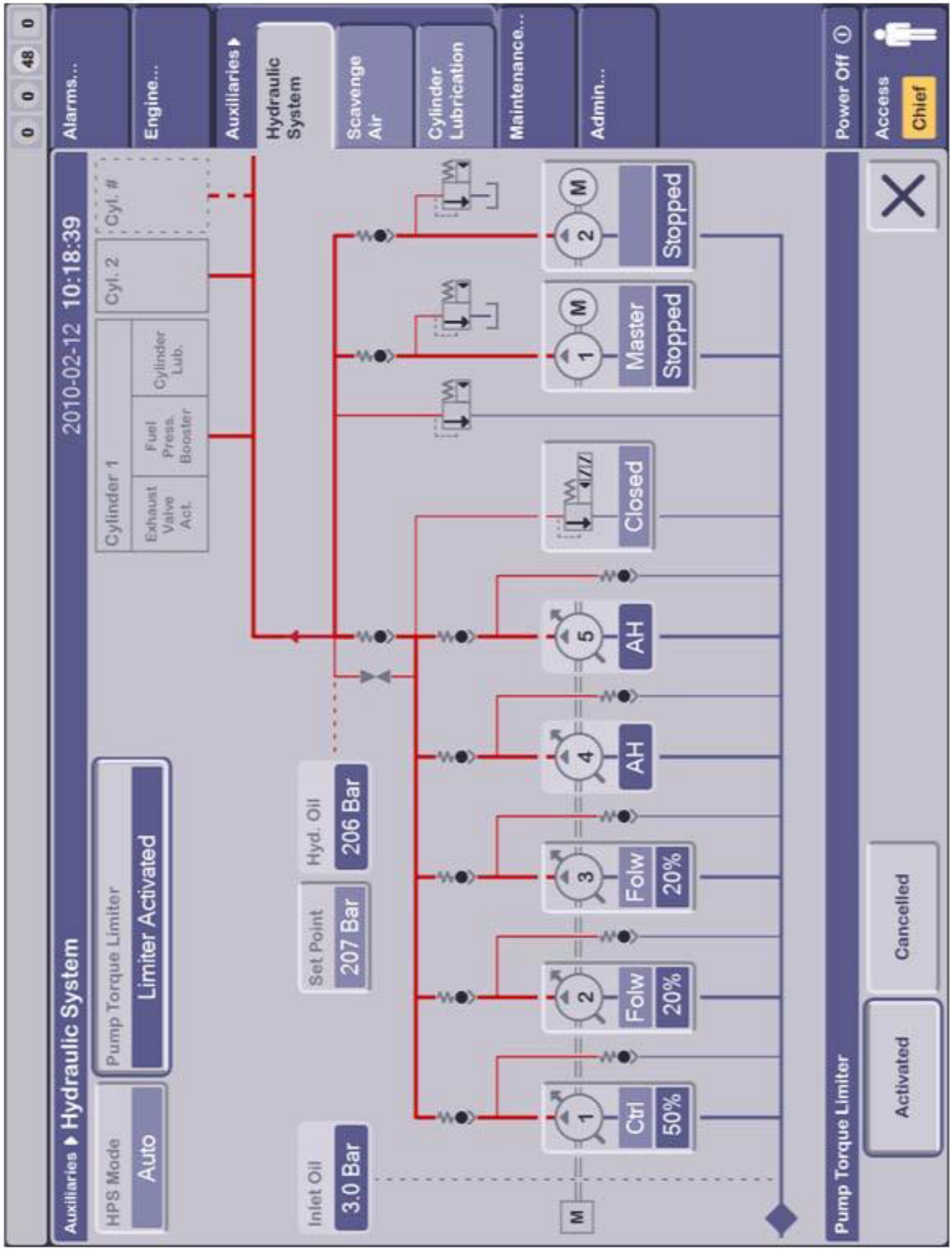

0 0 48 0
Alarms...
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Chief
Engine ▸ Chief Limiters
2010-02-12 10:26:01
Chief Max Speed
200.0 RPM
Engine Max Speed
200.0 RPM
All
1 2 3 4 5 6 7 8 9 10 11 12
Chief Index Limit [%]
100
50
0
110
Exhaust Valve operation
Enabled
HCU status and reset
Normal
Apply
Chief Index Limit - Cyl. 1
Current
110
New
110

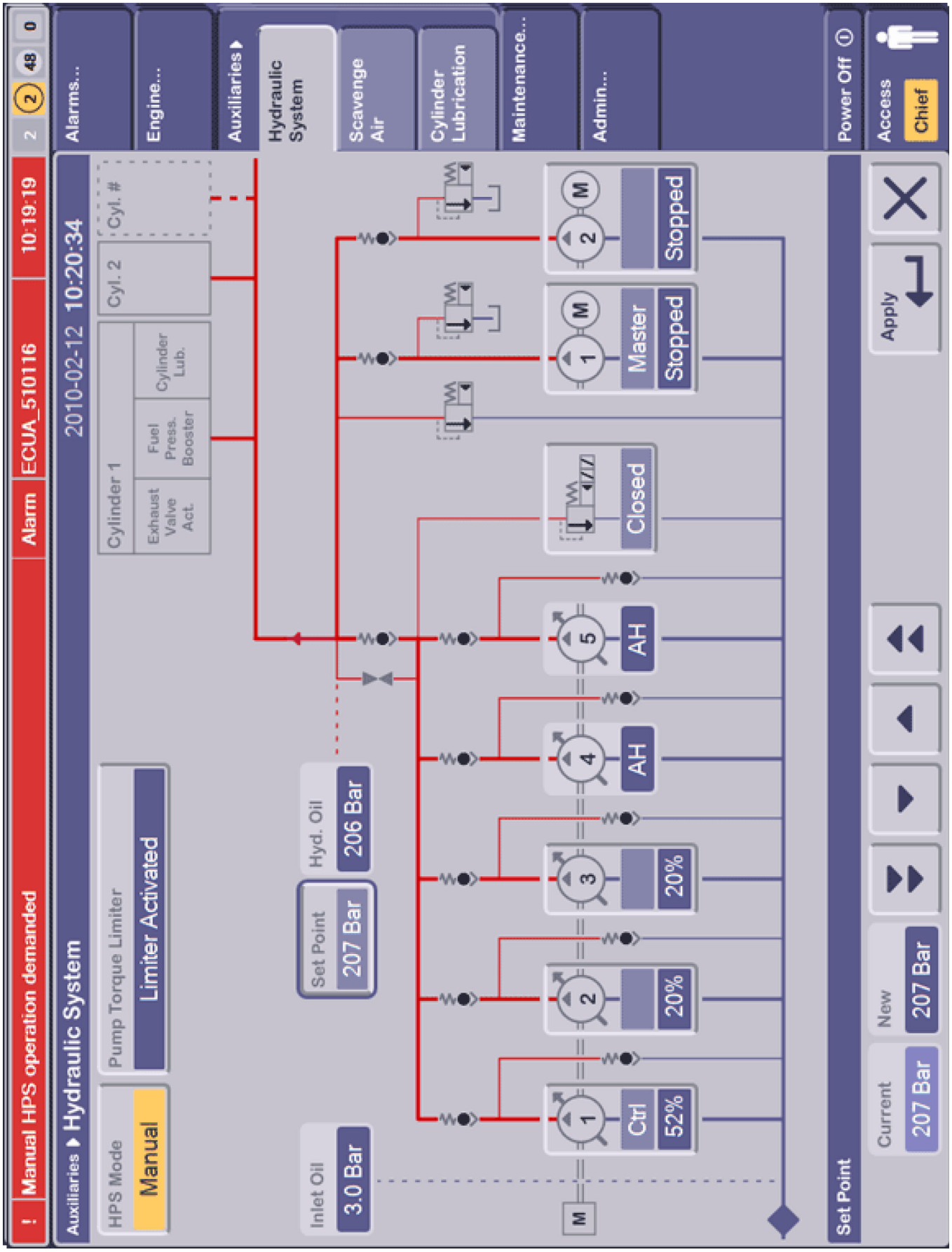

0 0 48 0
Alarms...
Engine ▸ Chief Limiters
2010-02-12 10:26:35
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Chief
Chief Max Speed
200.0 RPM
Engine Max Speed
200.0 RPM
All
1 2 3 4 5 6 7 8 9 10 11 12
Chief Index Limit [%]
100
50
0
110
Exhaust Valve operation
Enabled
HCU status and reset
Normal
WARNING! To avoid TC surging the engine load should be reduced below 20% before the exhaust valve operation on one cylinder is stopped.
Exhaust Valve Operation - Cyl. 1
Enabled
Stopped

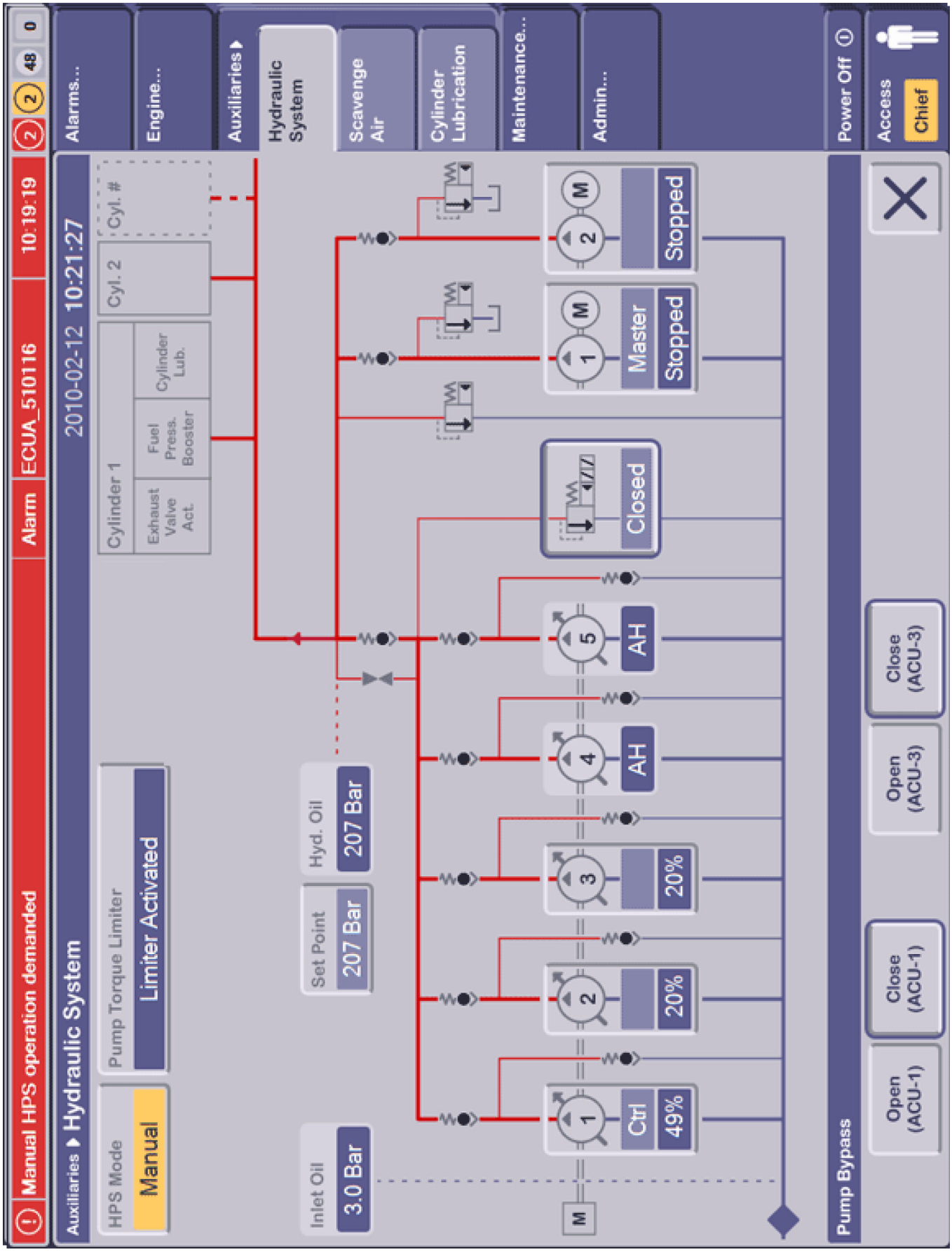

!
ELFIVA Fdbck Sign. Fail.(Slw Dw)
Alarm
CCU2_030406
08:30:28
18
12
48
0
Engine ▸ Chief Limiters
2010-03-11 08:31:00
Alarms...
Engine ▸
Operation
Status
Process Information
Process Adjustment
Chief Limiters
Auxiliaries...
Maintenance...
Admin...
Power Off
Access
Chief
Chief Max Speed
200.0 RPM
Engine Max Speed
200.0 RPM
All
1 2 3 4 5 6 7 8 9 10 11 12
Chief Index Limit [%]
100
50
0
110
Exhaust Valve operation
Enabled
HCU status and reset
Normal
Fault
HCU Status - Cyl. 2
Reset

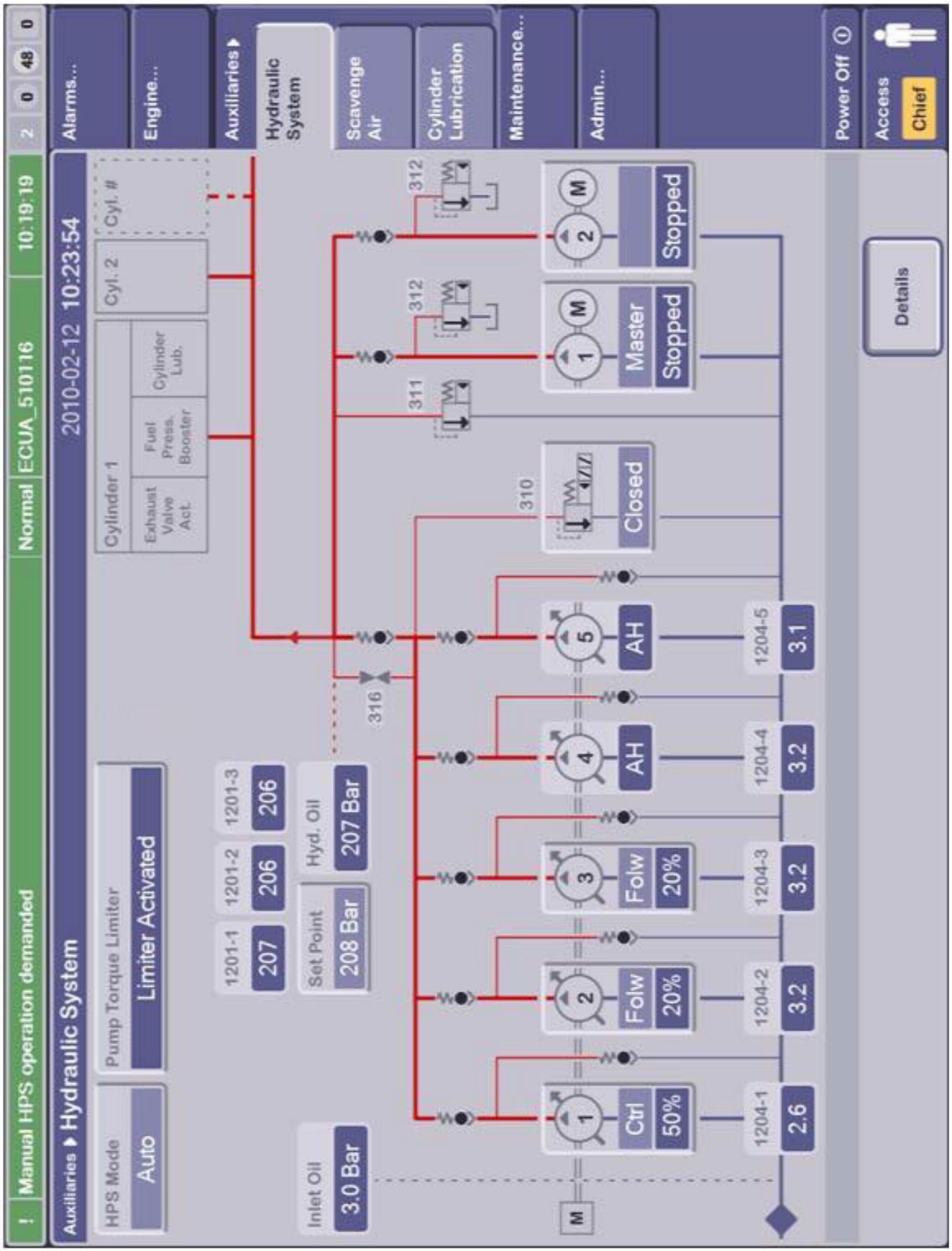

Supv. Ch34,4111,Exhaust Valve Posi
Normal
CCU1_411104
13:13:23
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Hydraulic System
2010-02-05 13:14:30
HPS Mode
Auto
Pump Torque Limiter
Limiter Activated
Inlet Oil
2.6 Bar
Set Point
184 Bar
Hyd. Oil
183 Bar
Cylinder 1
Exhaust Valve Act.
Fuel Press. Booster
Cylinder Lub.
Cyl. 2
Cyl. #
Ctrl
50%
Folw
21%
Folw
21%
AH
AH
Closed
Master
Stopped
Stopped
Details

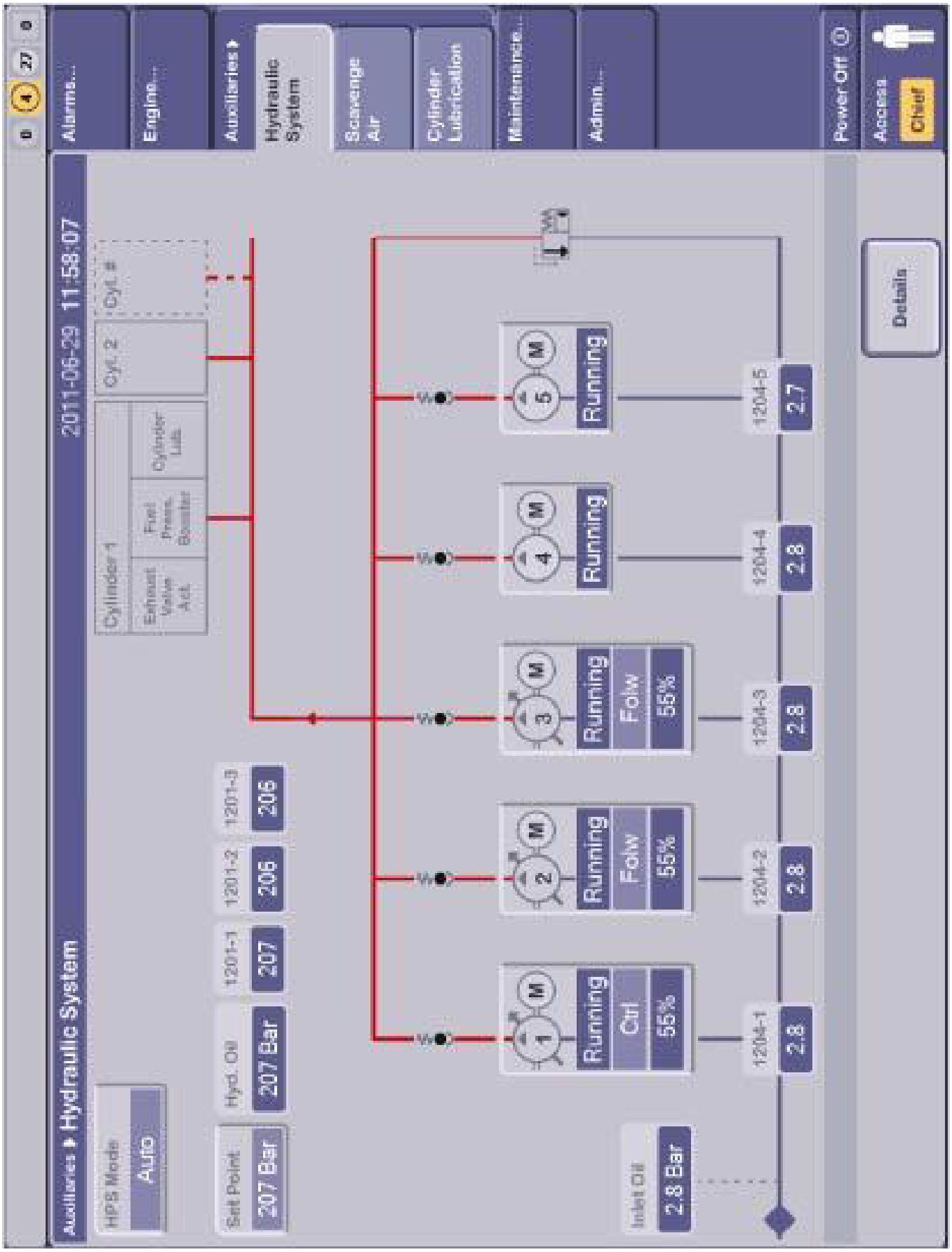

0 0 48 0
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Hydraulic System
2010-02-12 10:17:59
Cyl. #
Cyl. 2
Cylinder 1
Exhaust Valve Act.
Fuel Press. Booster
Cylinder Lub.
Pump Torque Limiter
Limiter Activated
HPS Mode
Auto
Inlet Oil
3.0 Bar
Set Point
207 Bar
Hyd. Oil
207 Bar
M
1 Ctrl 51%
2 Folw 20%
3 Folw 20%
4 AH
5 AH
1 M Master Stopped
2 M Stopped
Closed
HPS Mode
Automatic
Manual

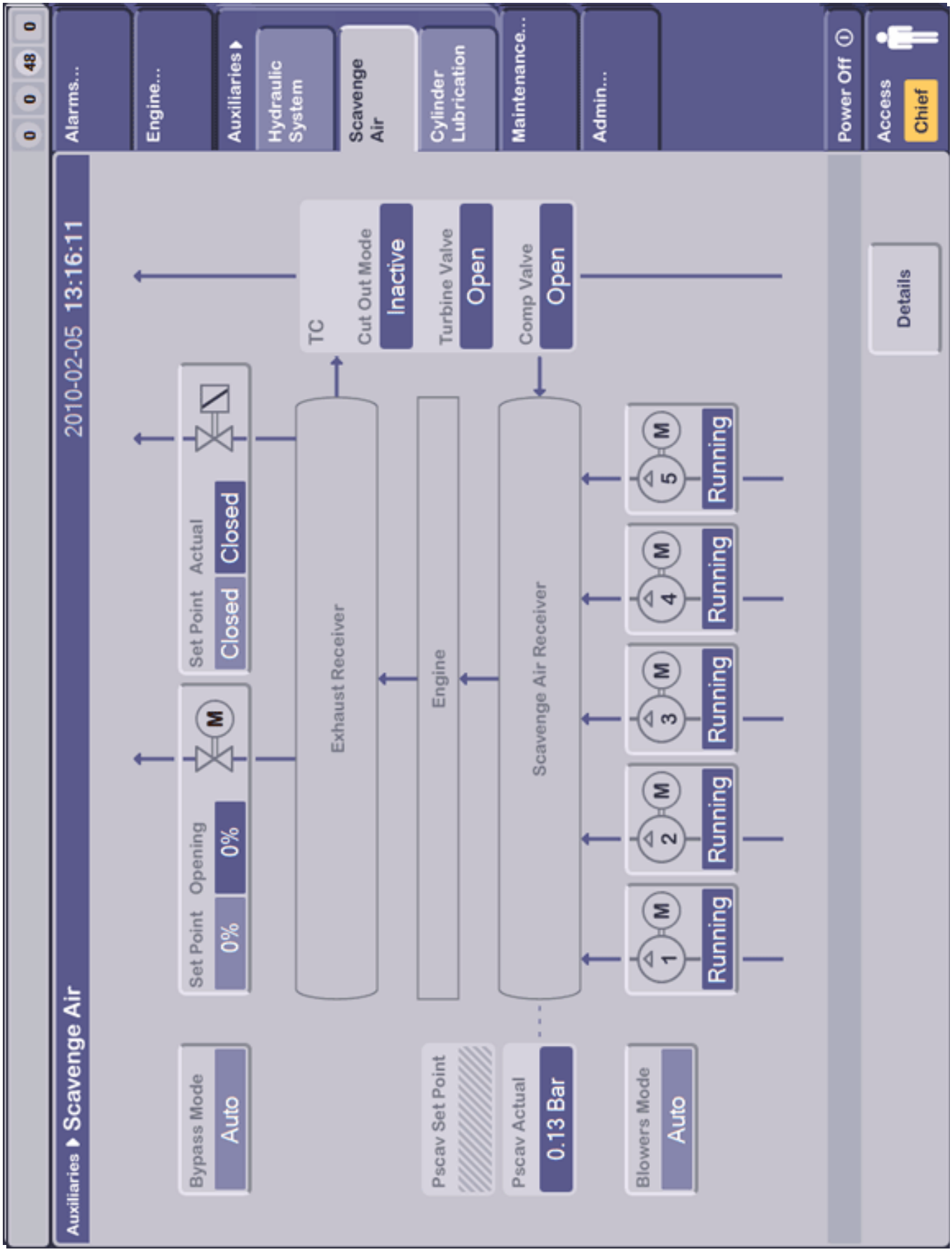

0 0 48 0
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Hydraulic System
2010-02-12 10:18:39
HPS Mode
Auto
Pump Torque Limiter
Limiter Activated
Cylinder 1
Exhaust Valve Act.
Fuel Press. Booster
Cylinder Lub.
Cyl. 2
Cyl. #
Inlet Oil
3.0 Bar
Set Point
207 Bar
Hyd. Oil
206 Bar
Ctrl
50%
Folw
20%
AH
Closed
Master
Stopped
Pump Torque Limiter
Activated
Cancelled

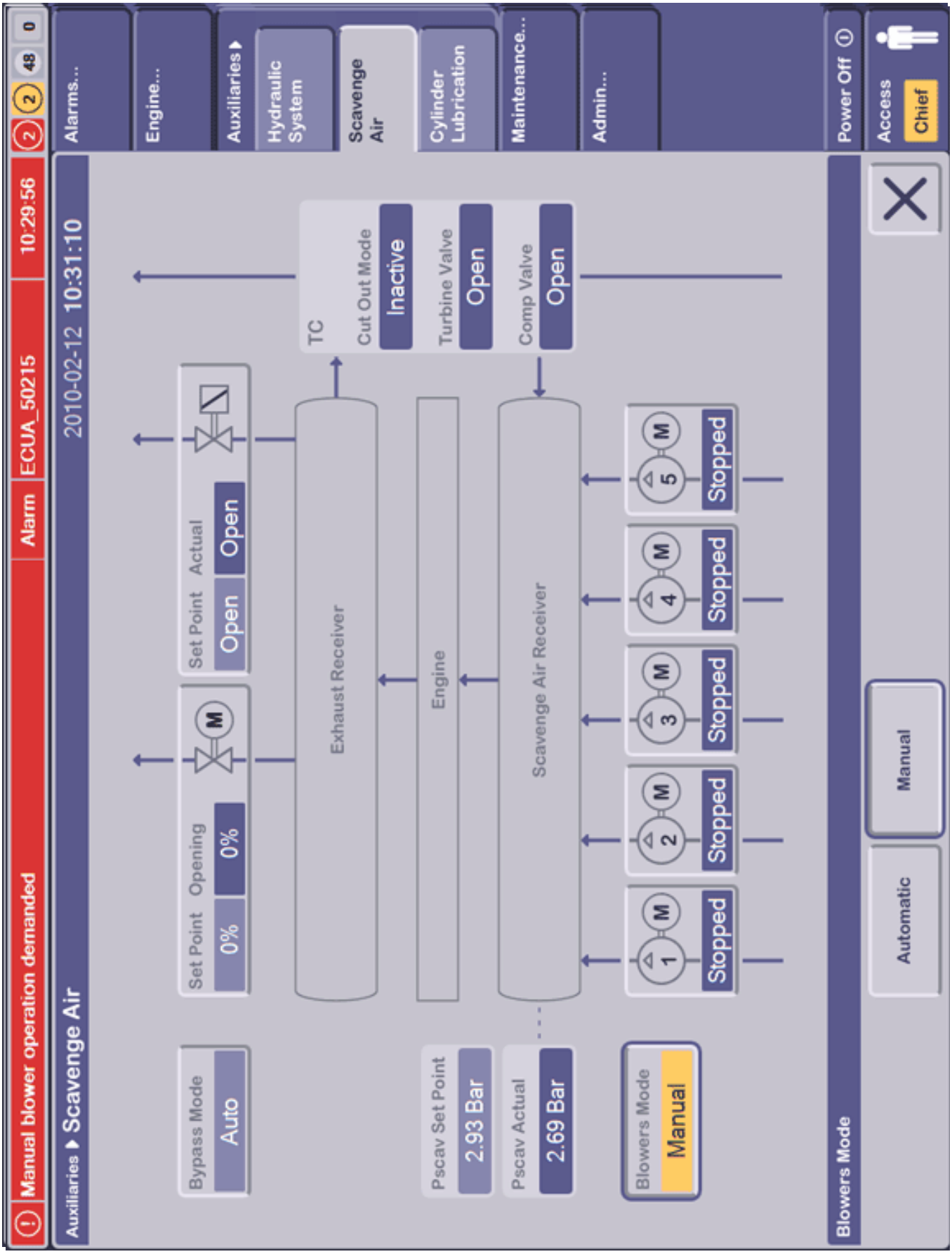

! Manual HPS operation demanded
Alarm
ECUA_510116
10:19:19
2
2
48
0
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Hydraulic System
2010-02-12 10:20:34
HPS Mode
Manual
Pump Torque Limiter
Limiter Activated
Cylinder 1
Exhaust Valve Act.
Fuel Press. Booster
Cylinder Lub.
Cyl. 2
Cyl. #
Inlet Oil
3.0 Bar
Hyd. Oil
206 Bar
Set Point
207 Bar
M
1
Ctrl
52%
2
20%
3
20%
4
AH
5
AH
1
M
Master
Stopped
2
M
Stopped
Closed
Set Point
Current
207 Bar
New
207 Bar
Apply

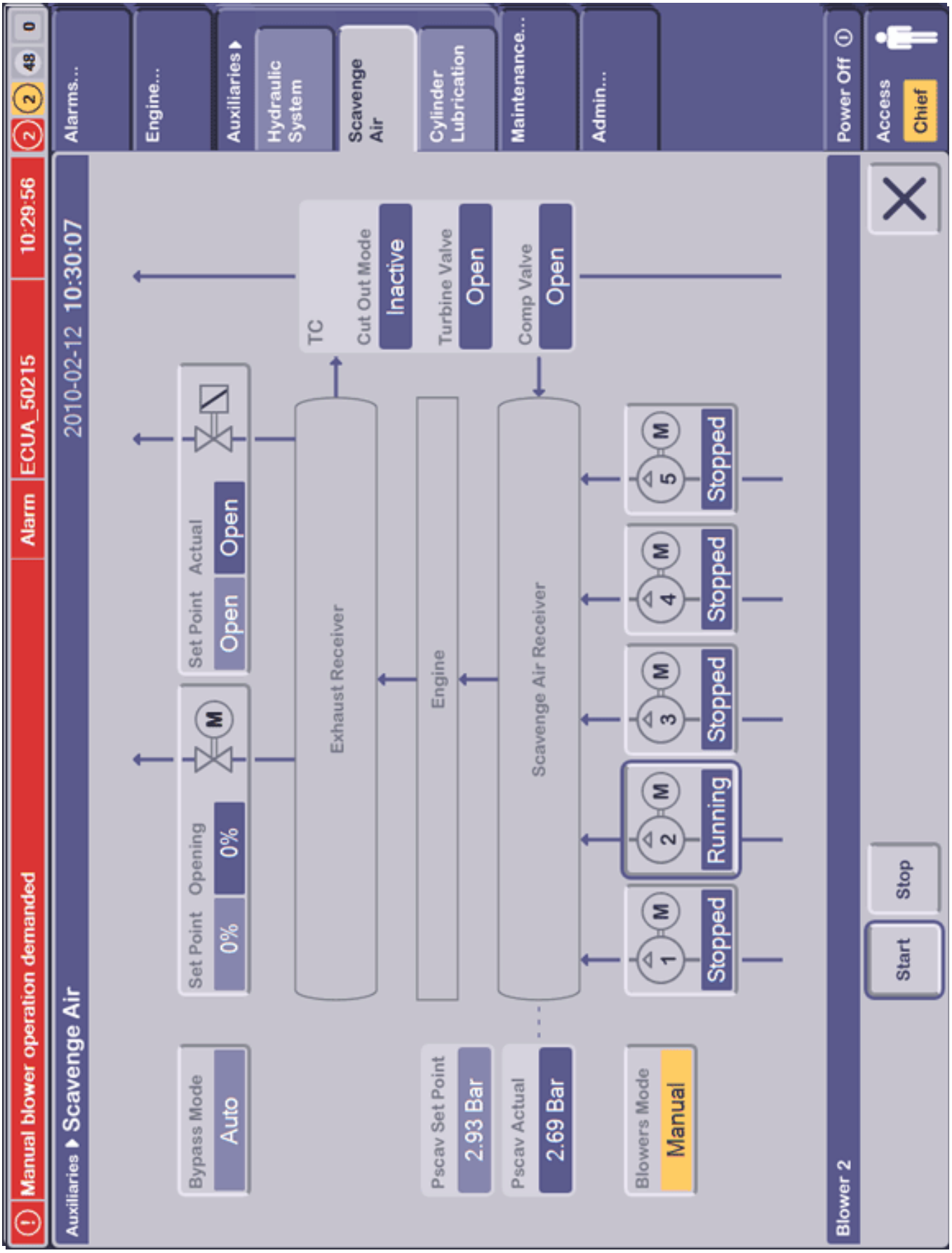

Manual HPS operation demanded
Alarm
ECUA_510116
10:19:19
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Hydraulic System
2010-02-12 10:21:27
HPS Mode
Manual
Pump Torque Limiter
Limiter Activated
Cylinder 1
Exhaust Valve Act.
Fuel Press. Booster
Cylinder Lub.
Cyl. 2
Cyl. #
Inlet Oil
3.0 Bar
Set Point
207 Bar
Hyd. Oil
207 Bar
M
1
Ctrl
49%
2
20%
3
20%
4
AH
5
AH
Closed
1
M
Master
Stopped
2
M
Stopped
Pump Bypass
Open (ACU-1)
Close (ACU-1)
Open (ACU-3)
Close (ACU-3)

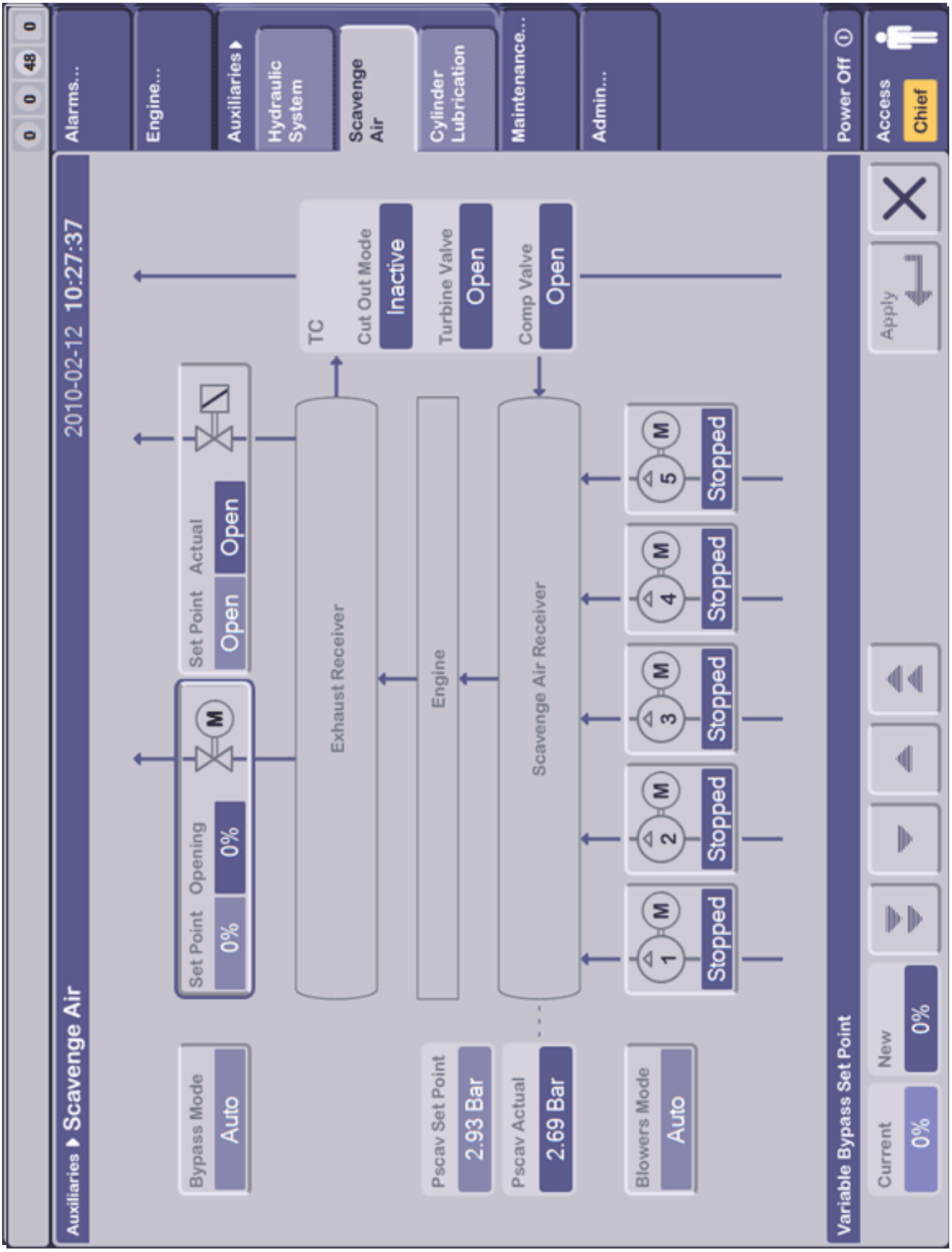

! Manual HPS operation demanded
Normal
ECUA_510116
10:19:19
2 0 48 0
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Hydraulic System
2010-02-12 10:23:54
Cylinder 1
Exhaust Valve Act.
Fuel Press. Booster
Cylinder Lub.
Cyl. 2
Cyl. #
HPS Mode
Auto
Pump Torque Limiter
Limiter Activated
Inlet Oil
3.0 Bar
1201-1
207
1201-2
206
1201-3
206
Set Point
208 Bar
Hyd. Oil
207 Bar
316
310
311
312
312
312
Closed
Master
Stopped
Stopped
Details
1204-1
2.6
1204-2
3.2
1204-3
3.2
1204-4
3.2
1204-5
3.1
Ctrl
50%
Folw
20%
Folw
20%
AH
AH
M

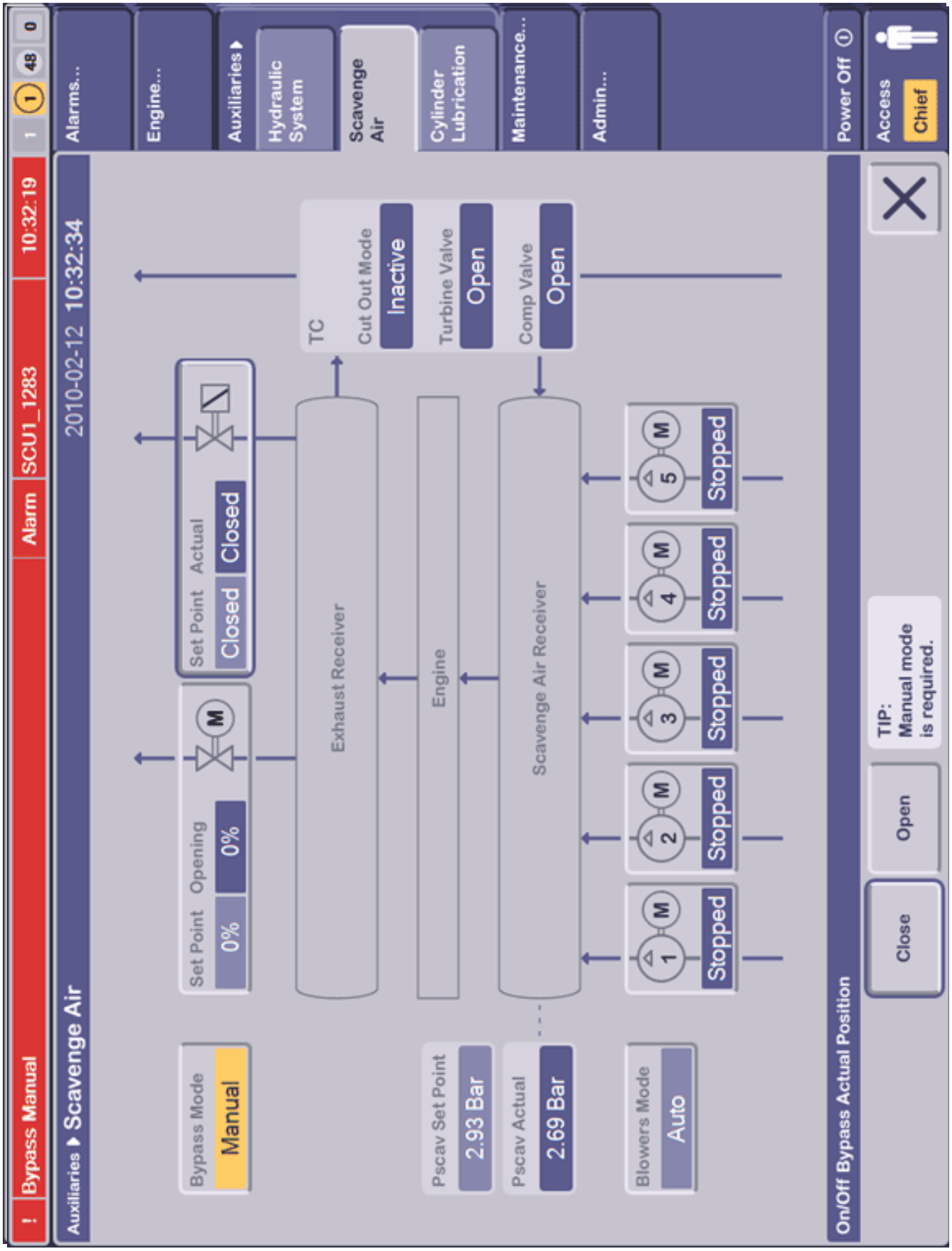

Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
2011-06-29 11:58:07
Auxiliaries ▸ Hydraulic System
Cyl. #
Cyl. 2
Cylinder 1
Exhaust Valve Act.
Fuel Press. Booster
Cylinder Lub.
HPS Mode
Auto
Set Point
207 Bar
Hyd. Oil
207 Bar
1201-1
207
1201-2
206
1201-3
206
Inlet Oil
2.8 Bar
1204-1
2.8
1204-2
2.8
1204-3
2.8
1204-4
2.8
1204-5
2.7
Running
Ctrl
Foll
55%
Details

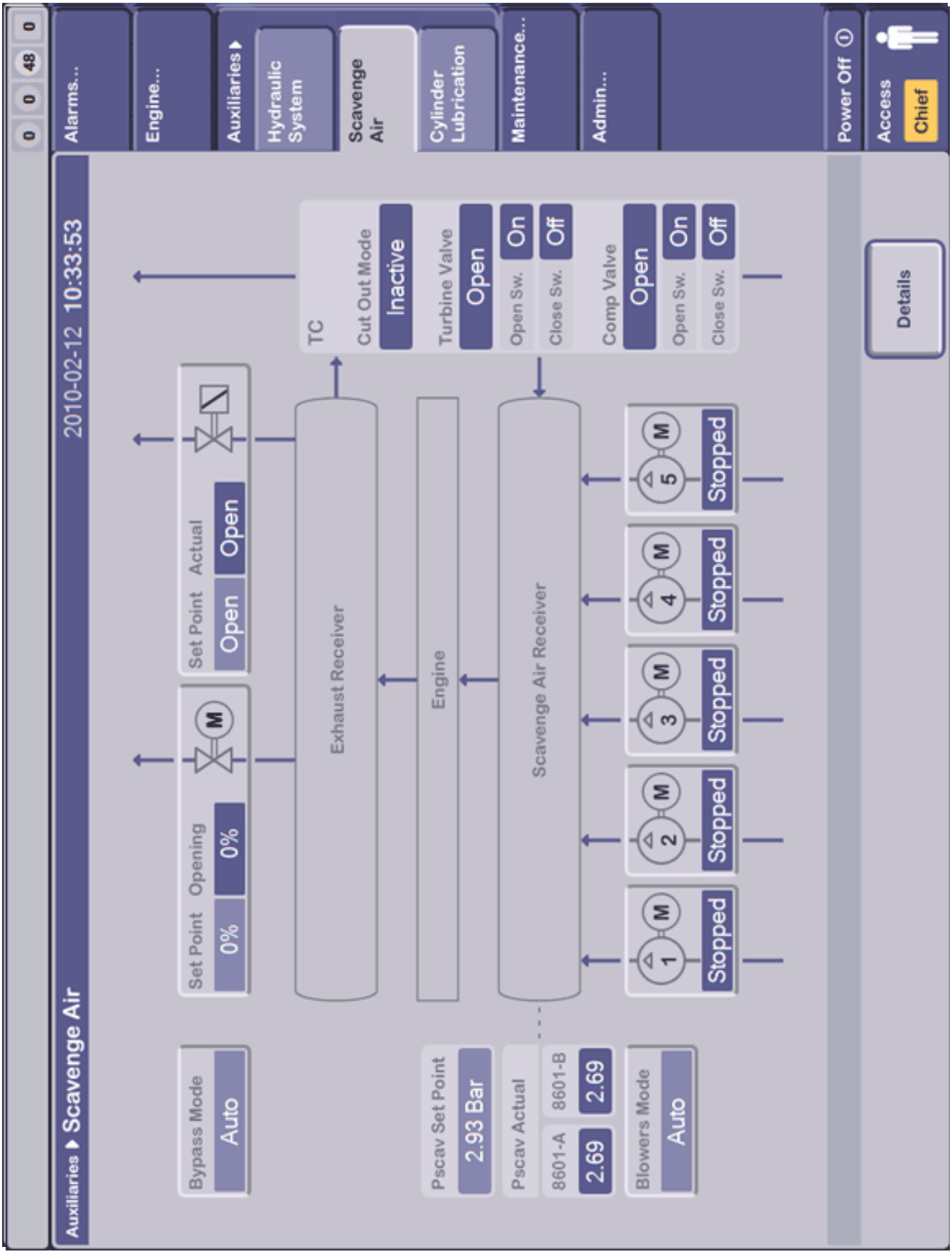

0 0 48 0
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Scavenge Air
2010-02-05 13:16:11
TC
Cut Out Mode
Inactive
Turbine Valve
Open
Comp Valve
Open
Details
Set Point Opening
0%
0%
Set Point Actual
Closed
Closed
Exhaust Receiver
Engine
Scavenge Air Receiver
Bypass Mode
Auto
Pscav Set Point
Pscav Actual
0.13 Bar
Blowers Mode
Auto
1 M Running
2 M Running
3 M Running
4 M Running
5 M Running

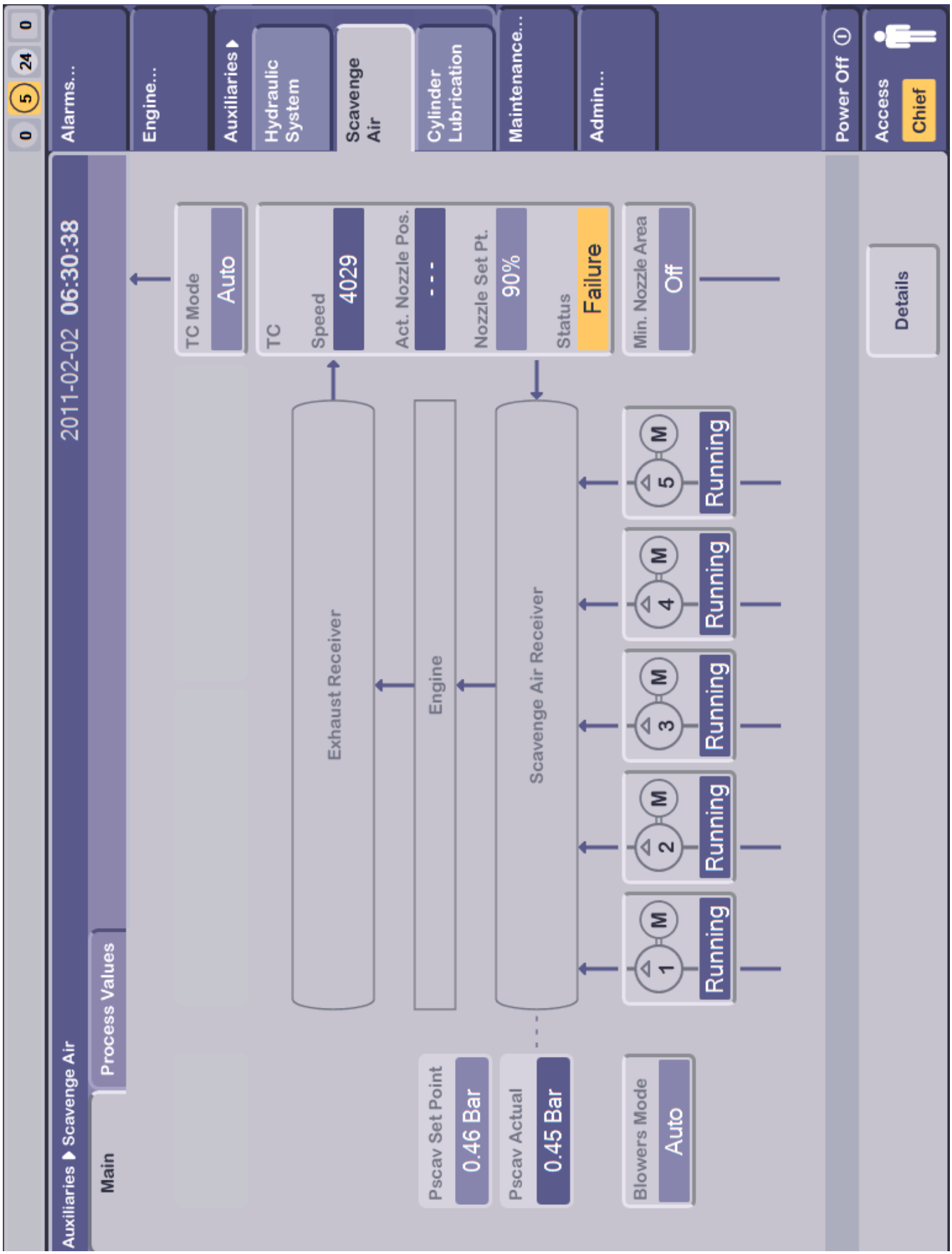

Manual blower operation demanded
Alarm
ECUA_50215
10:29:56
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Scavenge Air
2010-02-12 10:31:10
Bypass Mode
Auto
Set Point Opening
0%
0%
Set Point Actual
Open
Open
Exhaust Receiver
TC
Cut Out Mode
Inactive
Turbine Valve
Open
Comp Valve
Open
Engine
Scavenge Air Receiver
Pscav Set Point
2.93 Bar
Pscav Actual
2.69 Bar
Blowers Mode
Manual
1
2
3
4
5
Stopped
Blowers Mode
Automatic
Manual

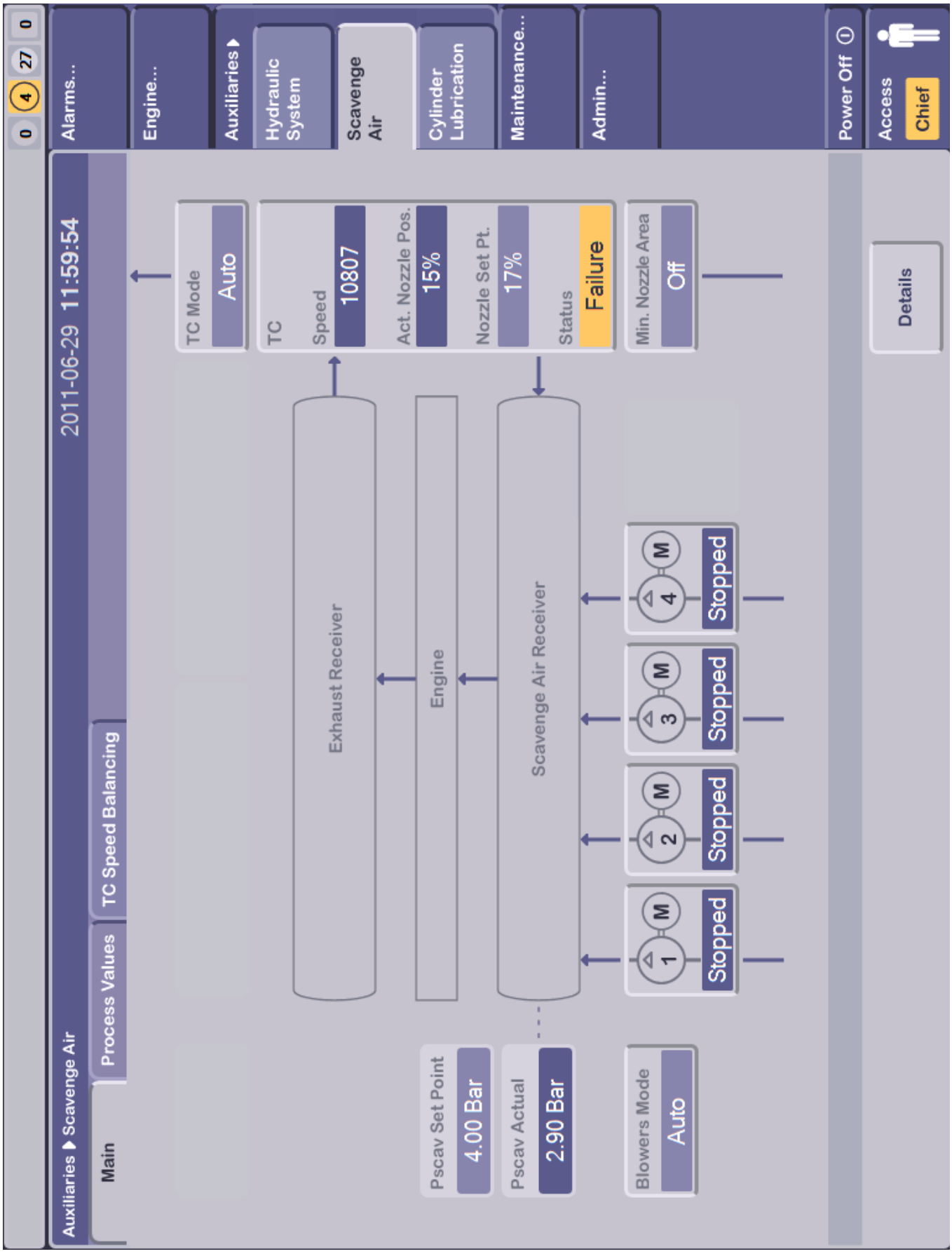

Manual blower operation demanded
Alarm
ECUA_50215
10:29:56
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Scavenge Air
2010-02-12 10:30:07
Bypass Mode
Auto
Set Point Opening
0%
0%
Set Point Actual
Open
Open
TC
Cut Out Mode
Inactive
Turbine Valve
Open
Comp Valve
Open
Exhaust Receiver
Engine
Scavenge Air Receiver
Pscav Set Point
2.93 Bar
Pscav Actual
2.69 Bar
Blowers Mode
Manual
1
Stopped
2
Running
3
Stopped
4
Stopped
5
Stopped
Start
Stop
Blower 2

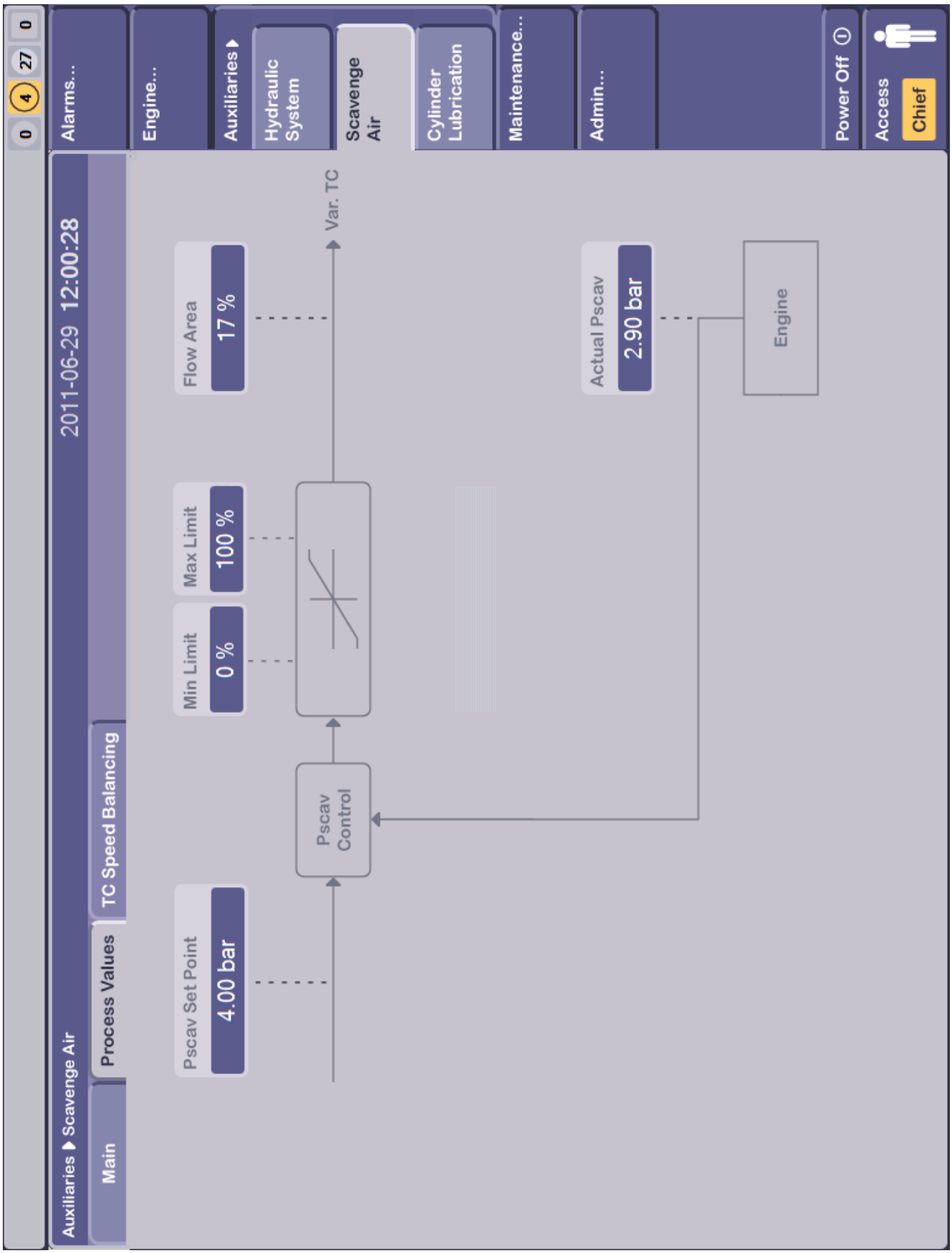

0 0 48 0
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Scavenge Air
2010-02-12 10:27:37
TC
Cut Out Mode
Inactive
Turbine Valve
Open
Comp Valve
Open
Set Point Actual
Open Open
Set Point Opening
0% 0%
Exhaust Receiver
Engine
Scavenge Air Receiver
Bypass Mode
Auto
Pscav Set Point
2.93 Bar
Pscav Actual
2.69 Bar
Blowers Mode
Auto
1 M Stopped
2 M Stopped
3 M Stopped
4 M Stopped
5 M Stopped
Apply
Variable Bypass Set Point
Current
0%
New
0%

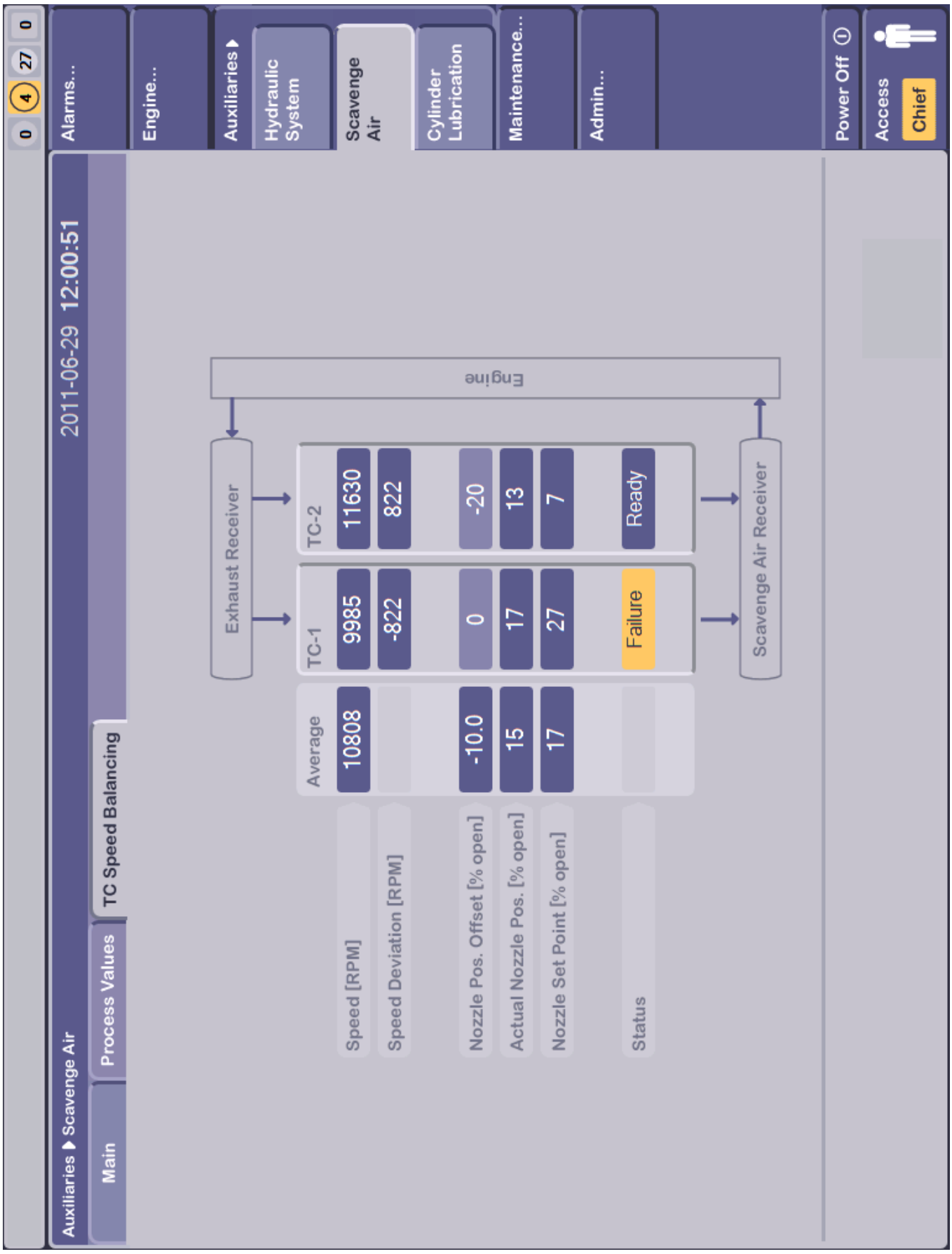

Bypass Manual
Alarm
SCU1_1283
10:32:19
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Scavenge Air
2010-02-12 10:32:34
TC
Cut Out Mode
Inactive
Turbine Valve
Open
Comp Valve
Open
Set Point Opening
0%
0%
Set Point Actual
Closed
Closed
Exhaust Receiver
Engine
Scavenge Air Receiver
Bypass Mode
Manual
Pscav Set Point
2.93 Bar
Pscav Actual
2.69 Bar
Blowers Mode
Auto
1
2
3
4
5
Stopped
Stopped
Stopped
Stopped
Stopped
TIP:
Manual mode is required.
Close
Open
On/Off Bypass Actual Position

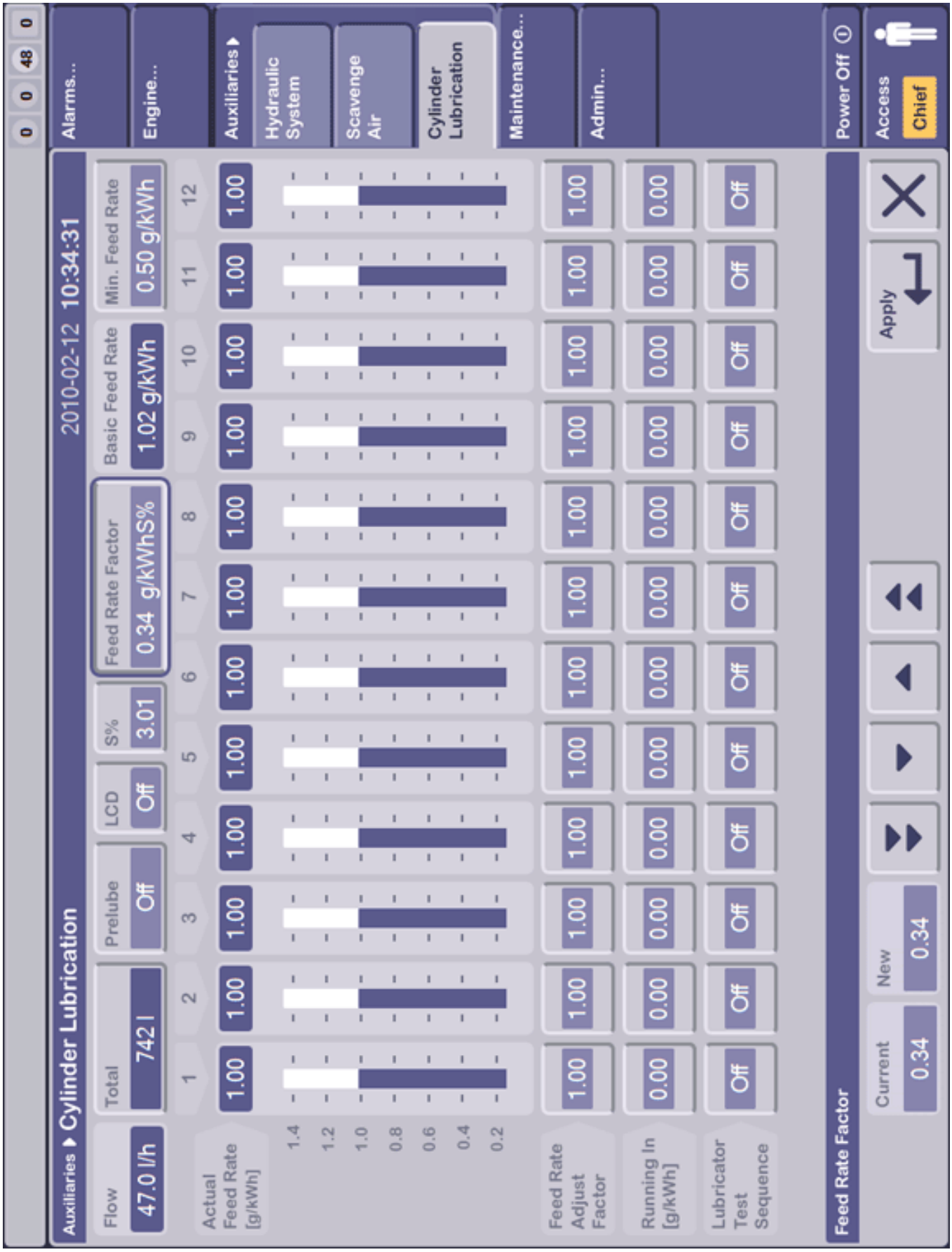

Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Scavenge Air
2010-02-12 10:33:53
Bypass Mode
Auto
Set Point Opening
0%
0%
Set Point Actual
Open
Open
Exhaust Receiver
Engine
Scavenge Air Receiver
TC
Cut Out Mode
Inactive
Turbine Valve
Open
Open Sw.
On
Close Sw.
Off
Comp Valve
Open
Open Sw.
On
Close Sw.
Off
Pscav Set Point
2.93 Bar
Pscav Actual
8601-A
2.69
8601-B
2.69
Blowers Mode
Auto
1
2
3
4
5
Stopped
Details

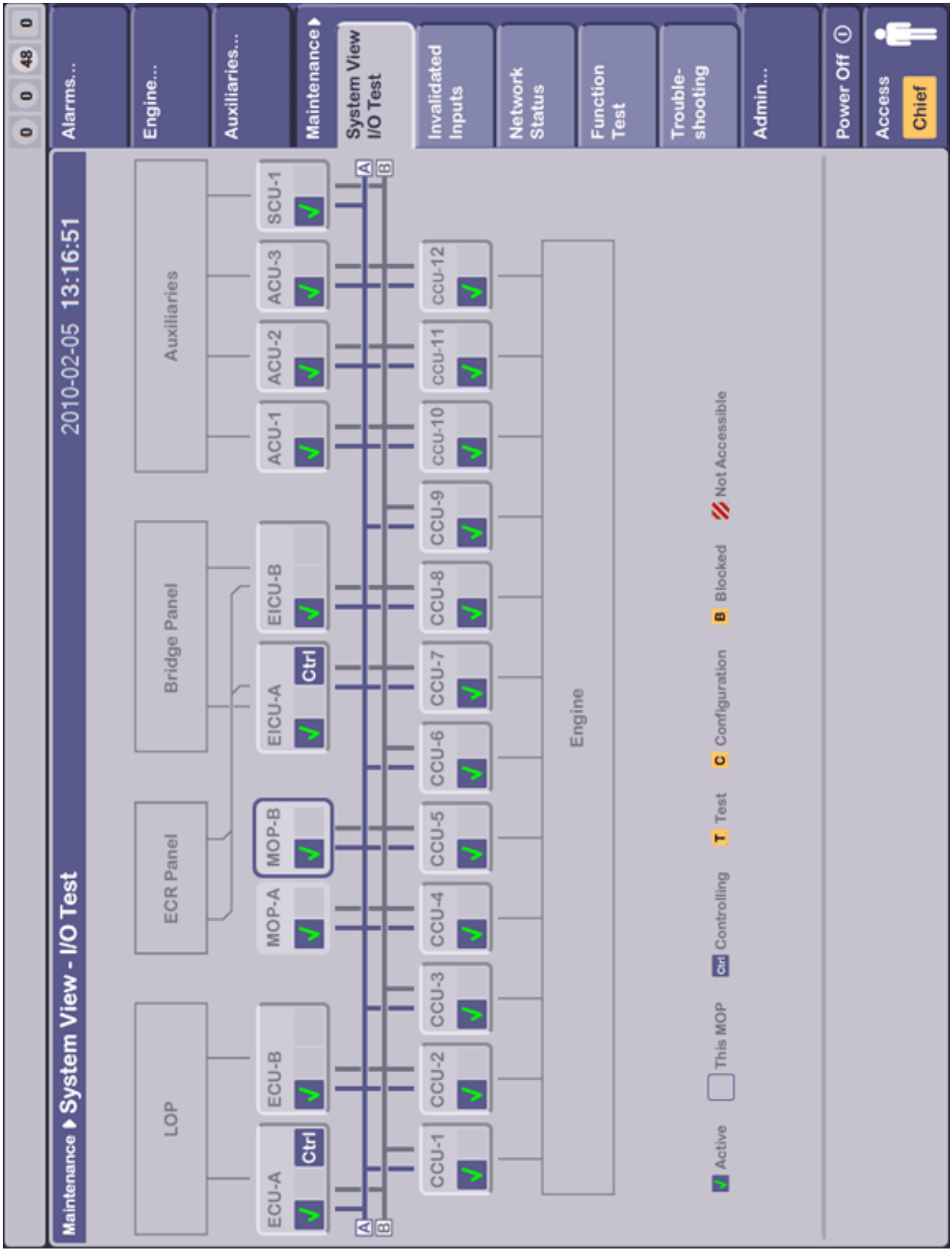

0
5
24
0
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
2011-02-02 06:30:38
Auxiliaries ▸ Scavenge Air
Main
Process Values
TC Mode
Auto
TC
Speed
4029
Act. Nozzle Pos.
- - -
Nozzle Set Pt.
90%
Status
Failure
Min. Nozzle Area
Off
Details
Exhaust Receiver
Engine
Scavenge Air Receiver
Pscav Set Point
0.46 Bar
Pscav Actual
0.45 Bar
Blowers Mode
Auto
1
M
Running
2
M
Running
3
M
Running
4
M
Running
5
M
Running


0
4
27
0
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
2011-06-29 11:59:54
Auxiliaries ▸ Scavenge Air
Main
Process Values
TC Speed Balancing
TC Mode
Auto
TC
Speed
10807
Act. Nozzle Pos.
15%
Nozzle Set Pt.
17%
Status
Failure
Min. Nozzle Area
Off
Details
Exhaust Receiver
Engine
Scavenge Air Receiver
Pscav Set Point
4.00 Bar
Pscav Actual
2.90 Bar
Blowers Mode
Auto
M
1
2
3
4
Stopped

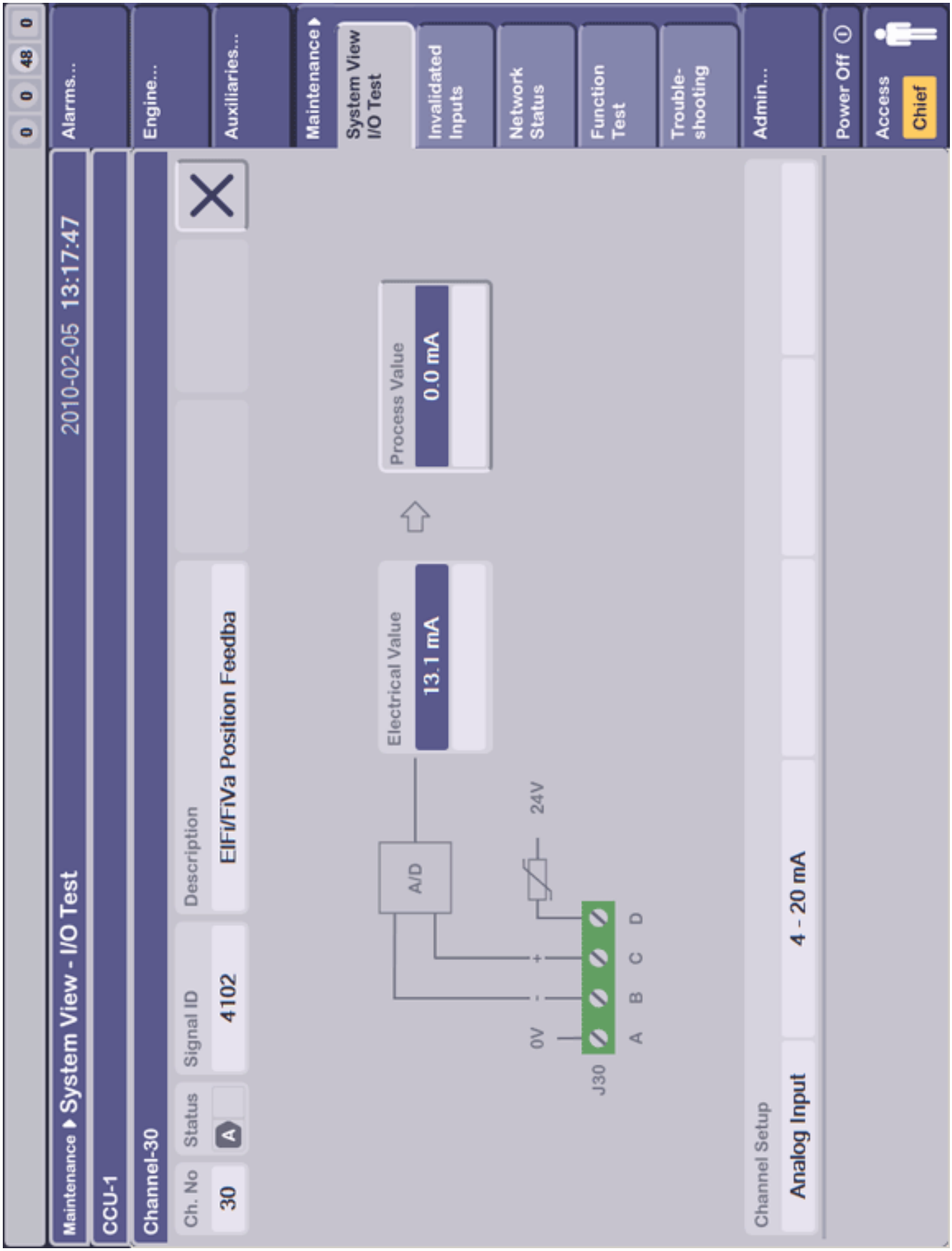

0
4
27
0
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
2011-06-29 12:00:28
Auxiliaries ▸ Scavenge Air
Main
Process Values
TC Speed Balancing
Pscav Set Point
4.00 bar
Min Limit
0 %
Max Limit
100 %
Flow Area
17 %
Var. TC
Pscav Control
Actual Pscav
2.90 bar
Engine

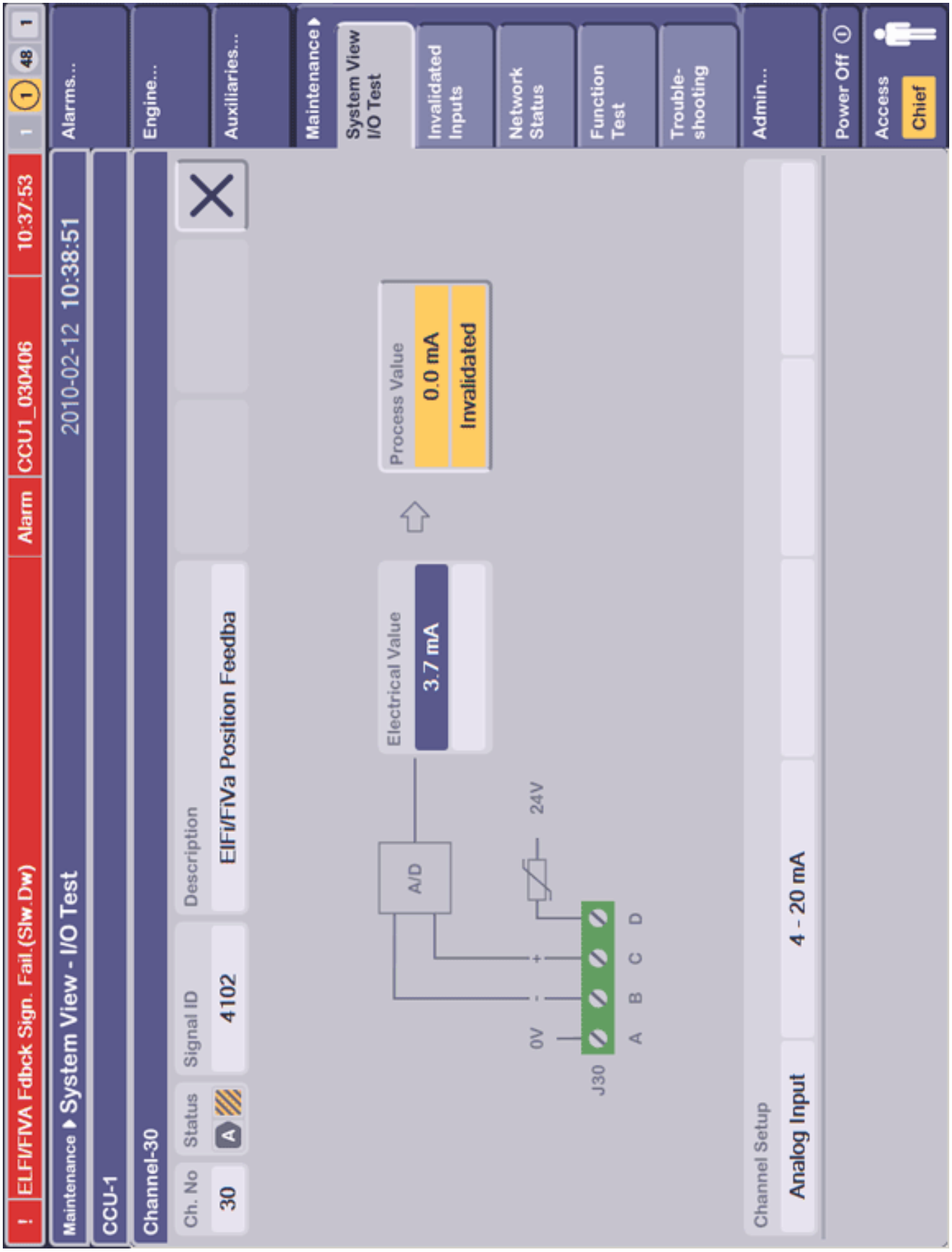

0
4
27
0
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
2011-06-29 12:00:51
Auxiliaries ▸ Scavenge Air
Main
Process Values
TC Speed Balancing
Engine
Exhaust Receiver
Scavenge Air Receiver
Average
TC-1
TC-2
Speed [RPM]
10808
9985
11630
Speed Deviation [RPM]
-822
822
Nozzle Pos. Offset [% open]
-10.0
0
-20
Actual Nozzle Pos. [% open]
15
17
13
Nozzle Set Point [% open]
17
27
7
Status
Failure
Ready

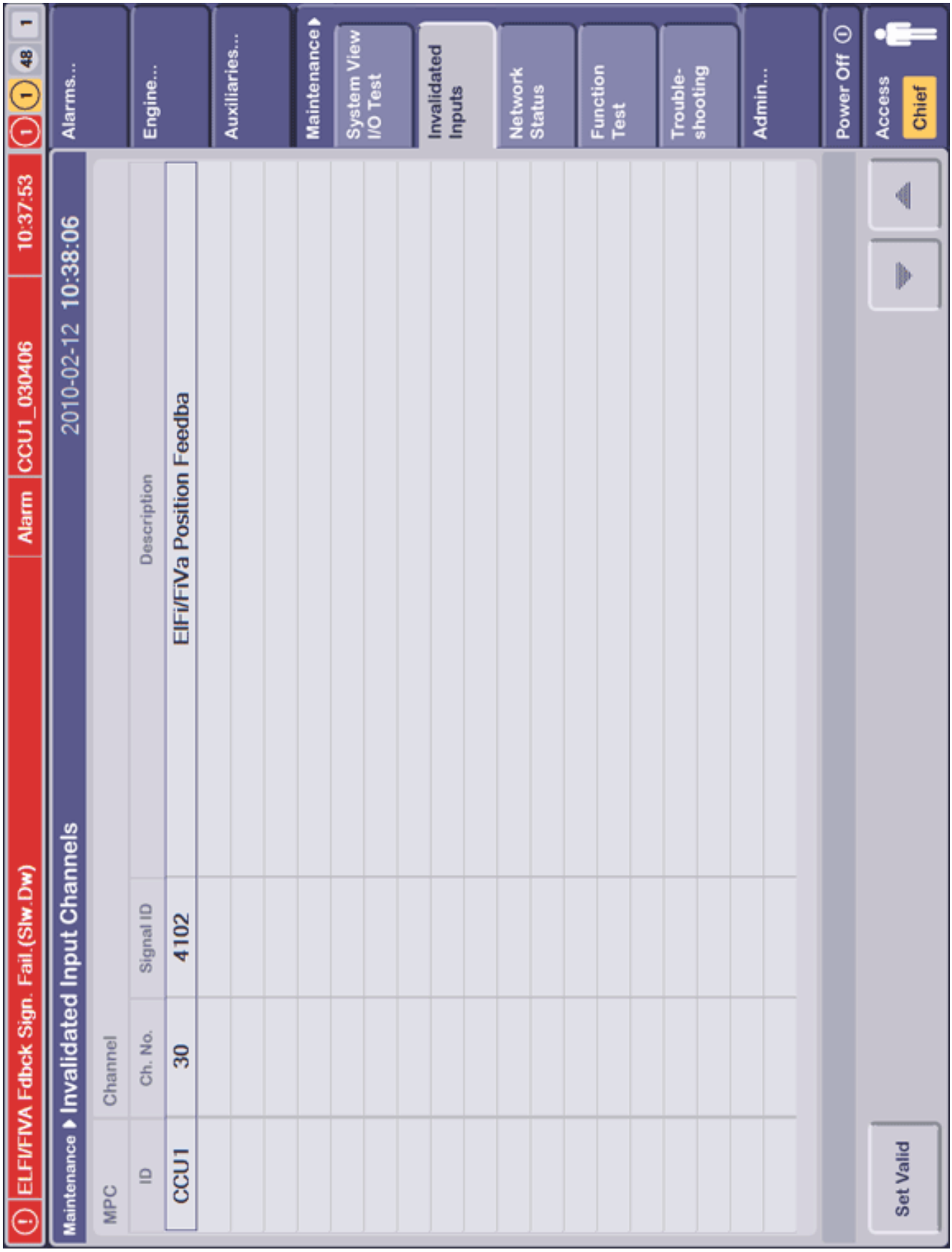

0 0 48 0
Alarms...
Engine...
Auxiliaries
Hydraulic System
Scavenge Air
Cylinder Lubrication
Maintenance...
Admin...
Power Off
Access
Chief
Auxiliaries ▸ Cylinder Lubrication
2010-02-12 10:34:31
Flow
47.0 l/h
Total
742 l
Prelube
Off
LCD
Off
S%
3.01
Feed Rate Factor
0.34 g/kWhS%
Basic Feed Rate
1.02 g/kWh
Min. Feed Rate
0.50 g/kWh
Actual Feed Rate [g/kWh]
1.4
1.2
1.0
0.8
0.6
0.4
0.2
1 2 3 4 5 6 7 8 9 10 11 12
1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Feed Rate Adjust Factor
1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00
Running In [g/kWh]
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
Lubricator Test Sequence
Off Off Off Off Off Off Off Off Off Off Off Off
Feed Rate Factor
Current
0.34
New
0.34
Apply

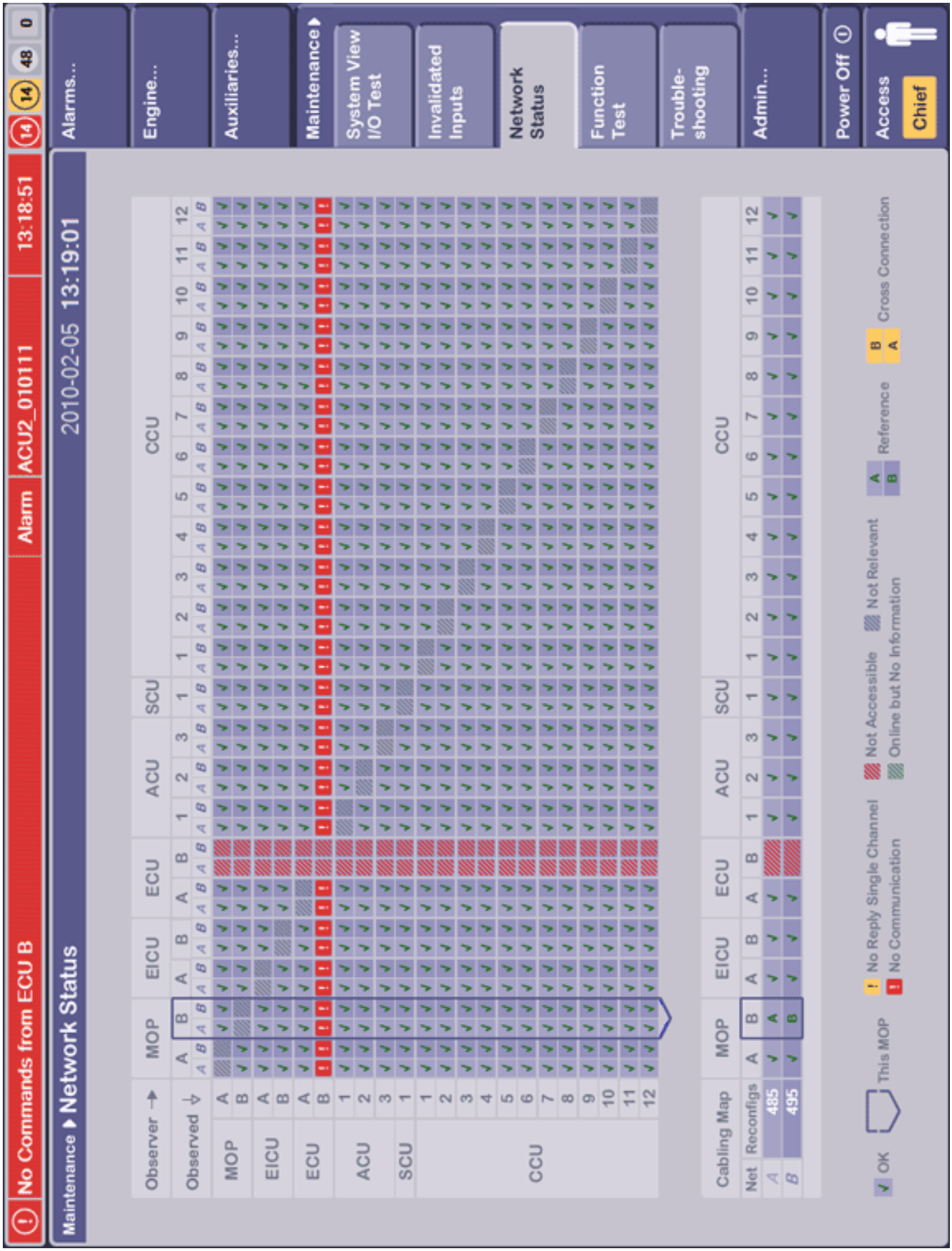

0 0 48 0
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ System View - I/O Test
2010-02-05 13:16:51
LOP
ECR Panel
Bridge Panel
Auxiliaries
ECU-A
Ctrl
ECU-B
MOP-A
MOP-B
EICU-A
Ctrl
EICU-B
ACU-1
ACU-2
ACU-3
SCU-1
CCU-1
CCU-2
CCU-3
CCU-4
CCU-5
CCU-6
CCU-7
CCU-8
CCU-9
CCU-10
CCU-11
CCU-12
A
B
Engine
Active
This MOP
Ctrl Controlling
T Test
C Configuration
B Blocked
Not Accessible

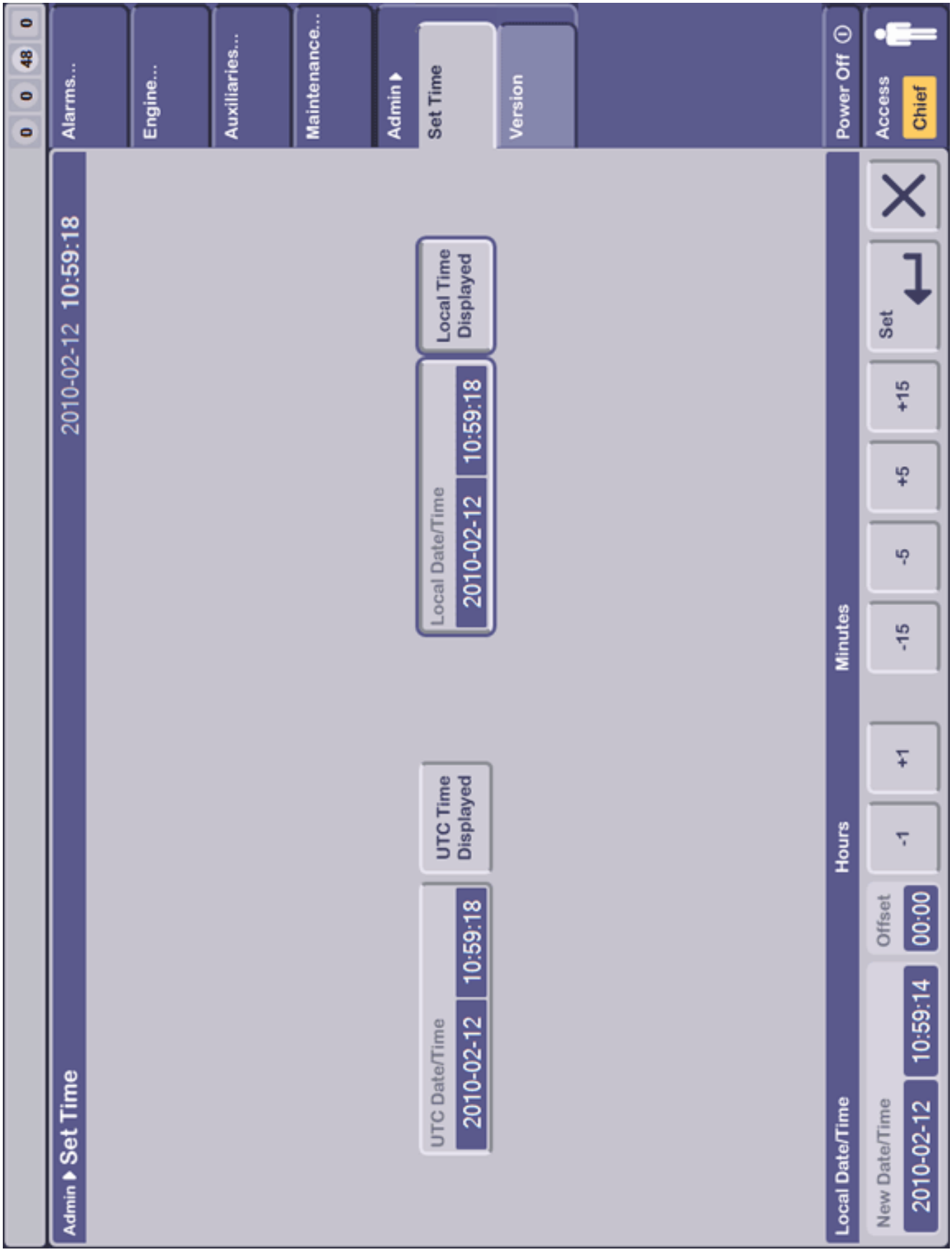

0 0 48 0
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ System View - I/O Test
2010-02-05 13:17:18
CCU-1
MPC Mode
Normal
A Analog Input
D Digital Input
A Analog Output
D Digital Output
Invalidated
Not used
Alarm
N/A Not available
Info ID Description Process Value
20 D 9971 Not Used ON
21 D 9980 Lube Oil Flow Missing OFF
22 D 9991 Not Used OFF
23 D 9998 Not Used ON
24 D 9992 Not Used OFF
25 D 9993 Not Used OFF
26 D 9994 Not Used OFF
27 D 9995 Not Used OFF
30 A 4102 ElFi/FiVa Position Feedba 0.0 mA
31 A 4114 Fuel Pump Plunger Positio 11.0 mA
32 D 2002_ Shut Down Safety System OFF
33 D 9972 Not Used OFF
34 A 4111 Exhaust Valve Position 5.6 mA
35 D 9996 Not Used OFF
36 D 9997 Not Used OFF
37 A 9999 Prop. Valve Test Set Poin 0.0 V
40 D 4001-A marker master False
41 D 4002-A marker slave False
42 D 4003-A quadrature master True
43 D 4004-A quadrature slave False
Info ID Description Process Value
44 D 4001-B marker master False
45 D 4002-B marker slave False
46 D 4003-B quadrature master False
47 D 4004-B quadrature slave True
48 D 010501 Not Used N/A
49 D 410801 ElVa Valve N/A
50 D 112001 Start Air Pilot Valve N/A
51 D 011601 Lubricator Pilot Valve N/A
52 D 0117 Cyl. Lubricator FeedBack N/A
53 D 010801 Cylinder TDC Pulse N/A
60 61 70 A 4107mA ElFi/FiVa Valve Control 0.0 mA
71 A Ch71V Test Output 0.0 V
80 81 82 83 84 85

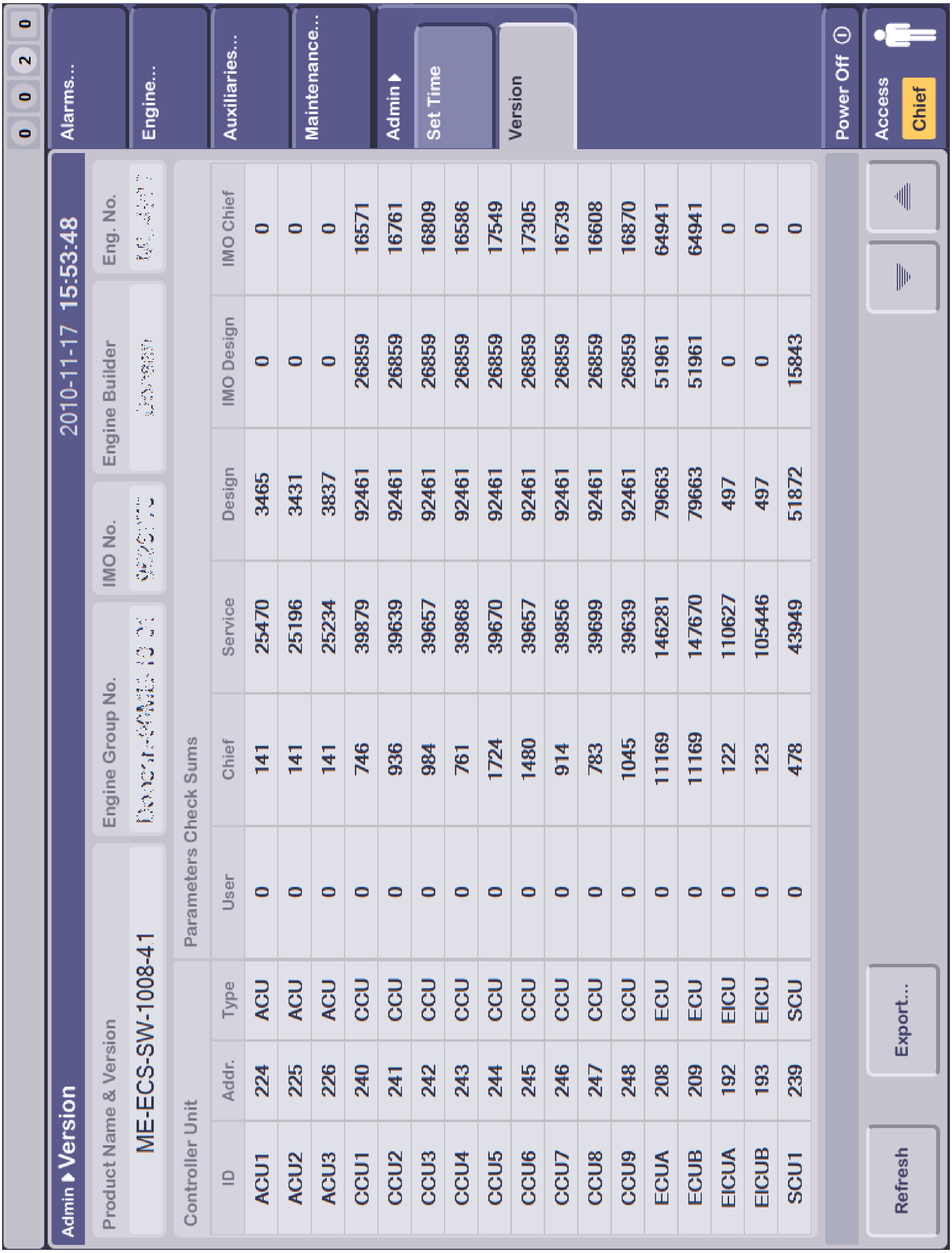

0 0 48 0
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ System View - I/O Test
2010-02-05 13:17:47
CCU-1
Channel-30
Ch. No
30
Status
A
Signal ID
4102
Description
EIFi/FiVa Position Feedba
Electrical Value
13.1 mA
A/D
Process Value
0.0 mA
24V
0V
J30
A B C D
Channel Setup
Analog Input
4 - 20 mA


ELFI/FIVA Fdbck Sign. Fail.(Slw.Dw)
Alarm
CCU1_030406
10:37:53
Maintenance ▸ System View - I/O Test
2010-02-12 10:38:51
Alarms...
Engine...
Auxiliaries...
Maintenance ▸
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
CCU-1
Channel-30
Ch. No
30
Status
Signal ID
4102
Description
ElFi/FiVa Position Feedba
Process Value
0.0 mA
Invalidated
Electrical Value
3.7 mA
A/D
24V
0V
J30
A B C D
Channel Setup
Analog Input
4 - 20 mA

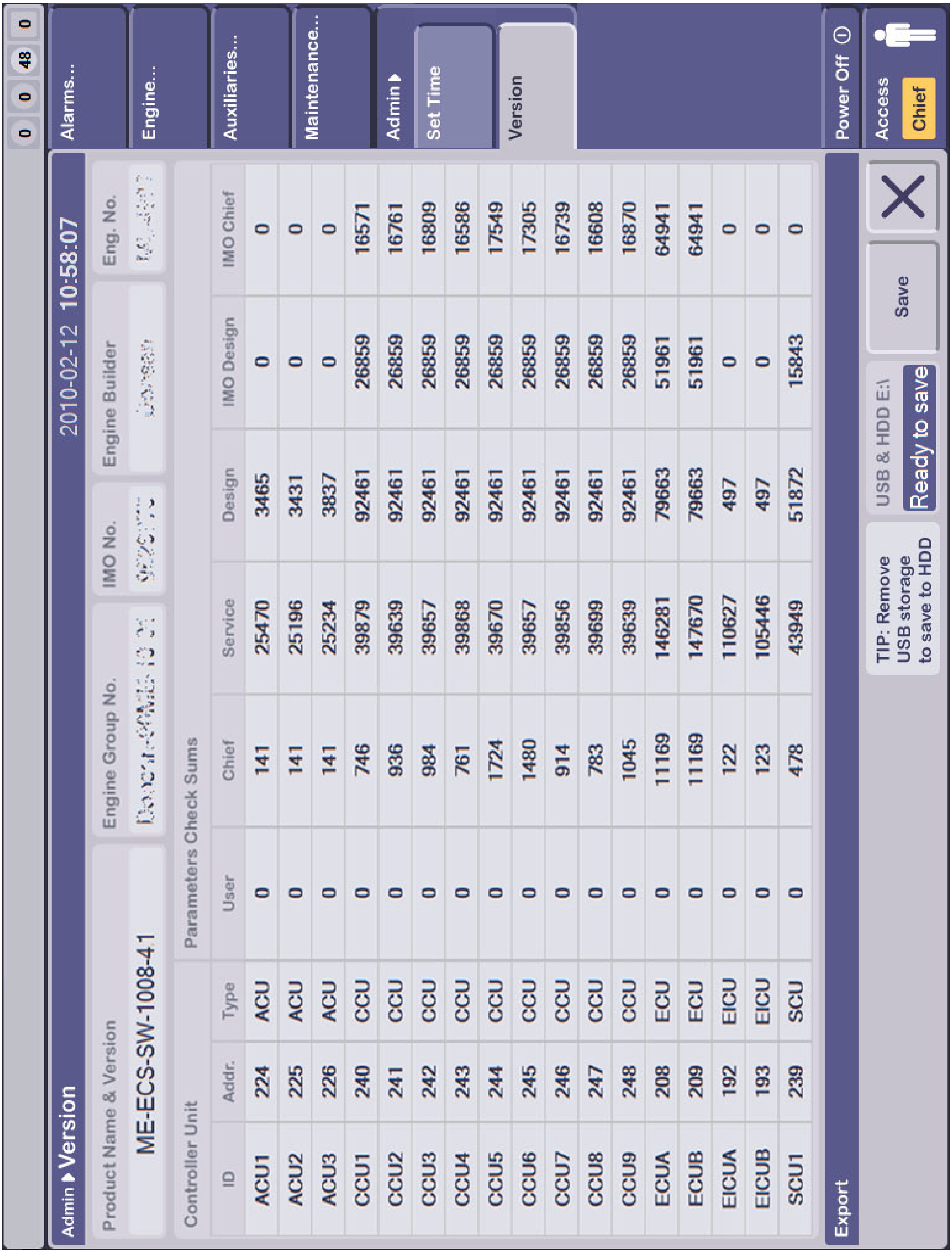

ELFI/FIVA Fdbck Sign. Fail.(Slw.Dw)
Alarm
CCU1_030406
10:37:53
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ Invalidated Input Channels
2010-02-12 10:38:06
MPC
ID
Channel
Ch. No.
Signal ID
Description
CCU1
30
4102
ELFI/FIVa Position Feedba
Set Valid

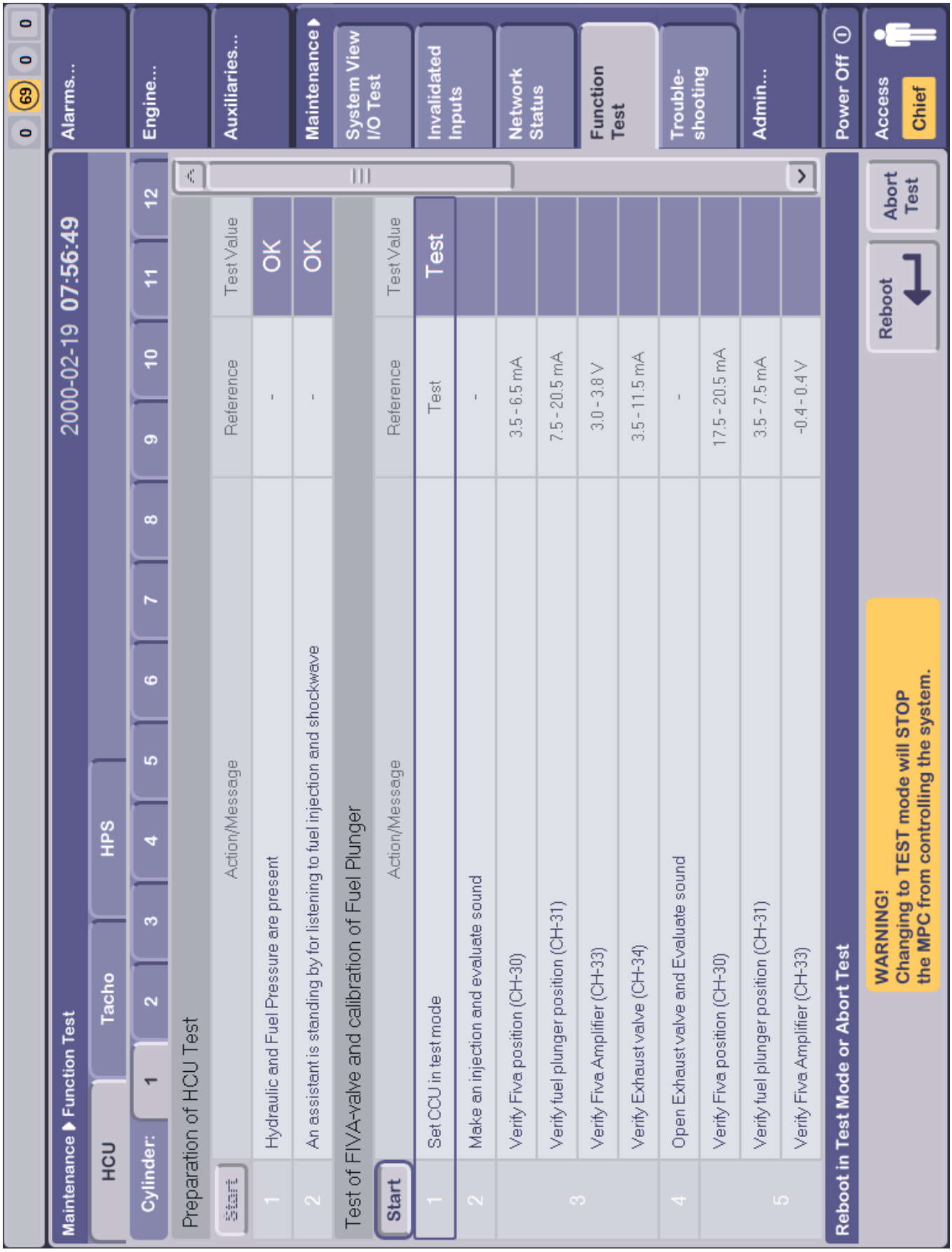

No Commands from ECU B
Alarm
ACU2_010111
13:18:51
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ Network Status
2010-02-05 13:19:01
Observer →
Observed ↓
MOP
EICU
ECU
ACU
SCU
CCU
Cabling Map
Net
Reconfigs
485
495
OK
This MOP
No Reply Single Channel
No Communication
Not Accessible
Online but No Information
Not Relevant
Reference
Cross Connection

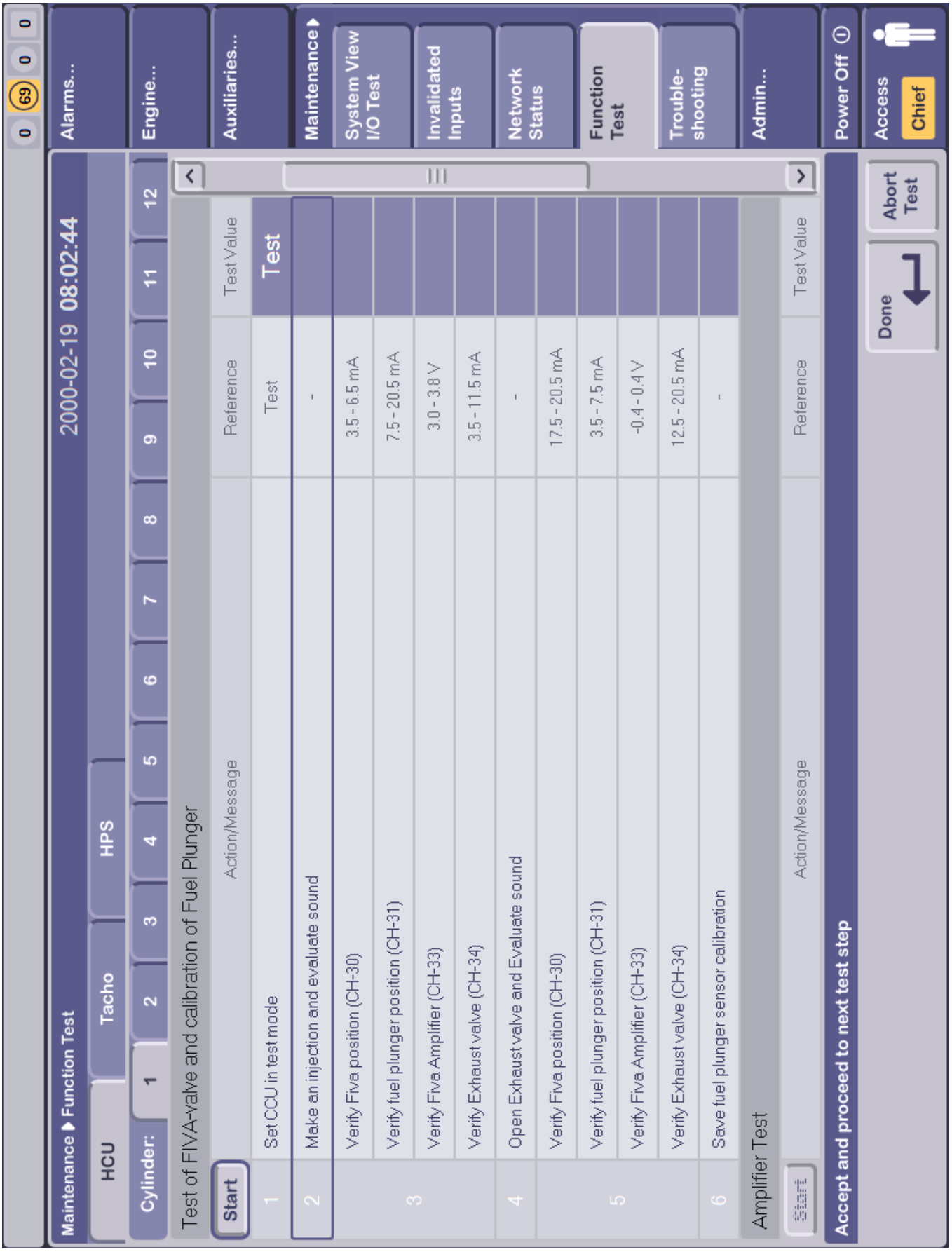

0 0 48 0
Alarms...
Engine...
Auxiliaries...
Maintenance...
Admin
Set Time
Version
Power Off
Access
Chief
Admin ▸ Set Time
2010-02-12 10:59:18
Local Time Displayed
Local Date/Time
2010-02-12 10:59:18
UTC Time Displayed
UTC Date/Time
2010-02-12 10:59:18
Local Date/Time
Hours
Minutes
-1
+1
-15
-5
+5
+15
Set
New Date/Time
2010-02-12 10:59:14
Offset
00:00

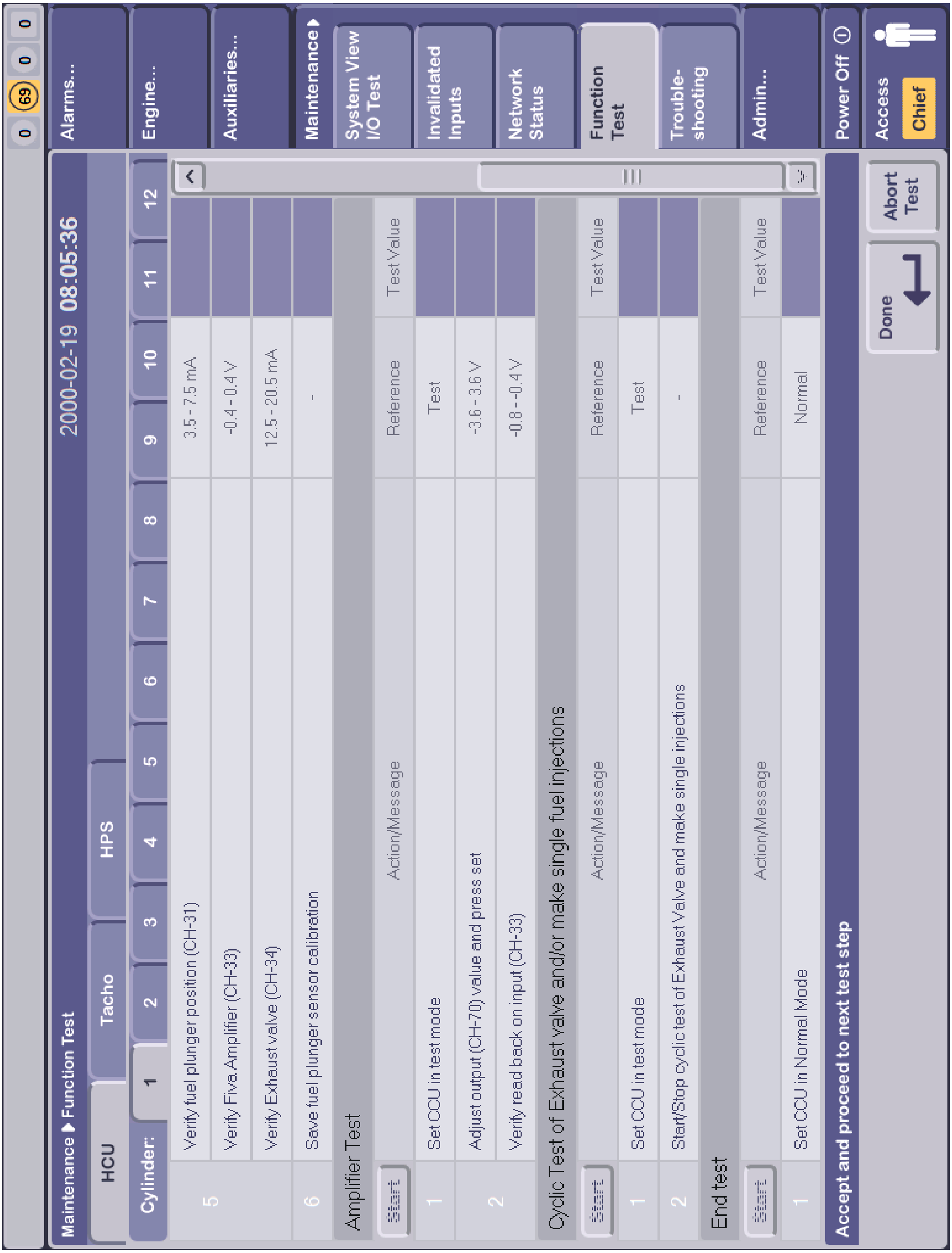


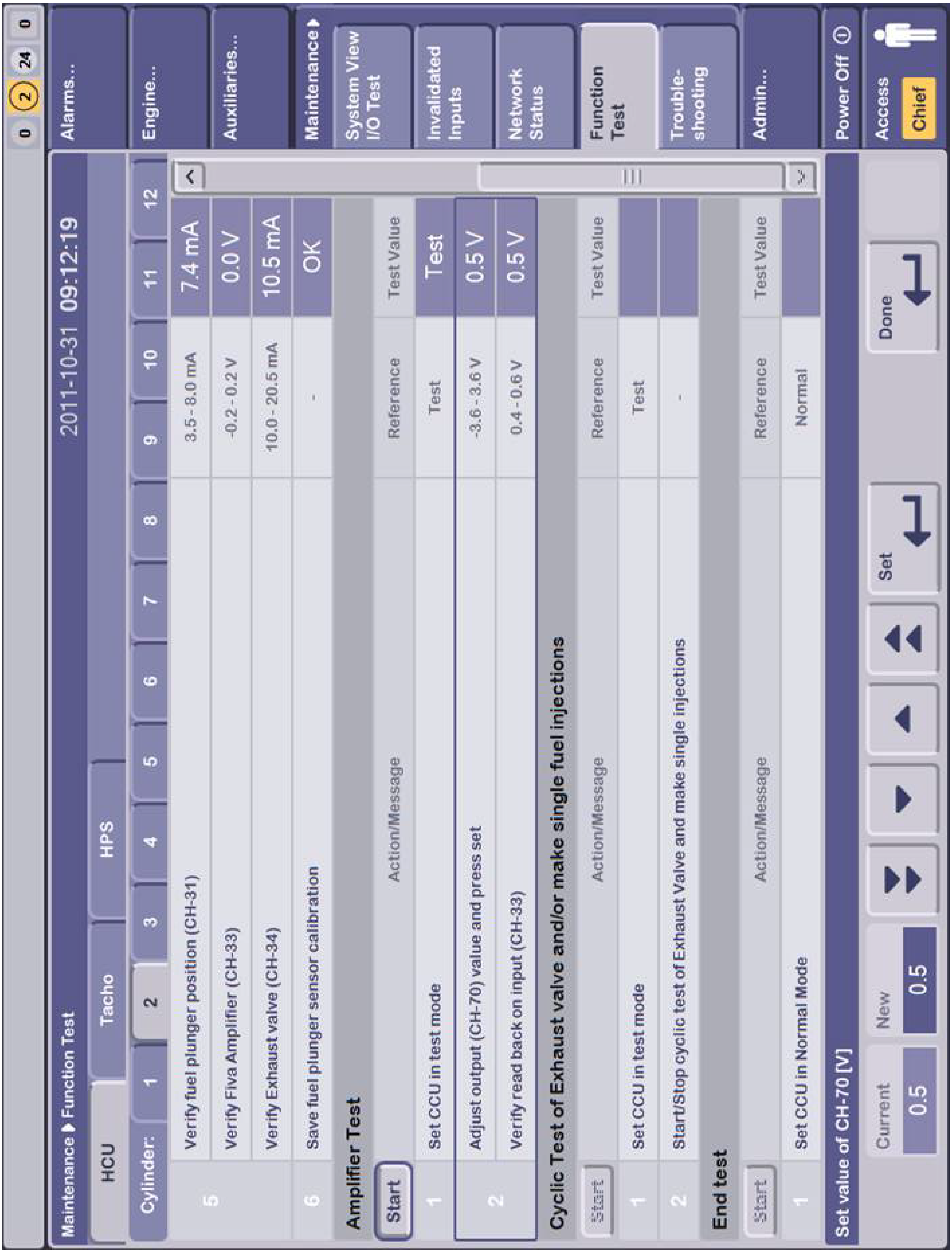
ID	Addr.	Type	User	Chief	Service	Design	IMO Design	IMO Chief
ACU1	224	ACU	0	141	25470	3465	0	0
ACU2	225	ACU	0	141	25196	3431	0	0
ACU3	226	ACU	0	141	25234	3837	0	0
CCU1	240	CCU	0	746	39879	92461	26859	16571
CCU2	241	CCU	0	936	39639	92461	26859	16761
CCU3	242	CCU	0	984	39657	92461	26859	16809
CCU4	243	CCU	0	761	39868	92461	26859	16586
CCU5	244	CCU	0	1724	39670	92461	26859	17549
CCU6	245	CCU	0	1480	39657	92461	26859	17305
CCU7	246	CCU	0	914	39856	92461	26859	16739
CCU8	247	CCU	0	783	39699	92461	26859	16608
CCU9	248	CCU	0	1045	39639	92461	26859	16870
ECUA	208	ECU	0	11169	146281	79663	51961	64941
ECUB	209	ECU	0	11169	147670	79663	51961	64941
EICUA	192	EICU	0	122	110627	497	0	0
EICUB	193	EICU	0	123	105446	497	0	0
SCU1	239	SCU	0	478	43949	51872	15843	0

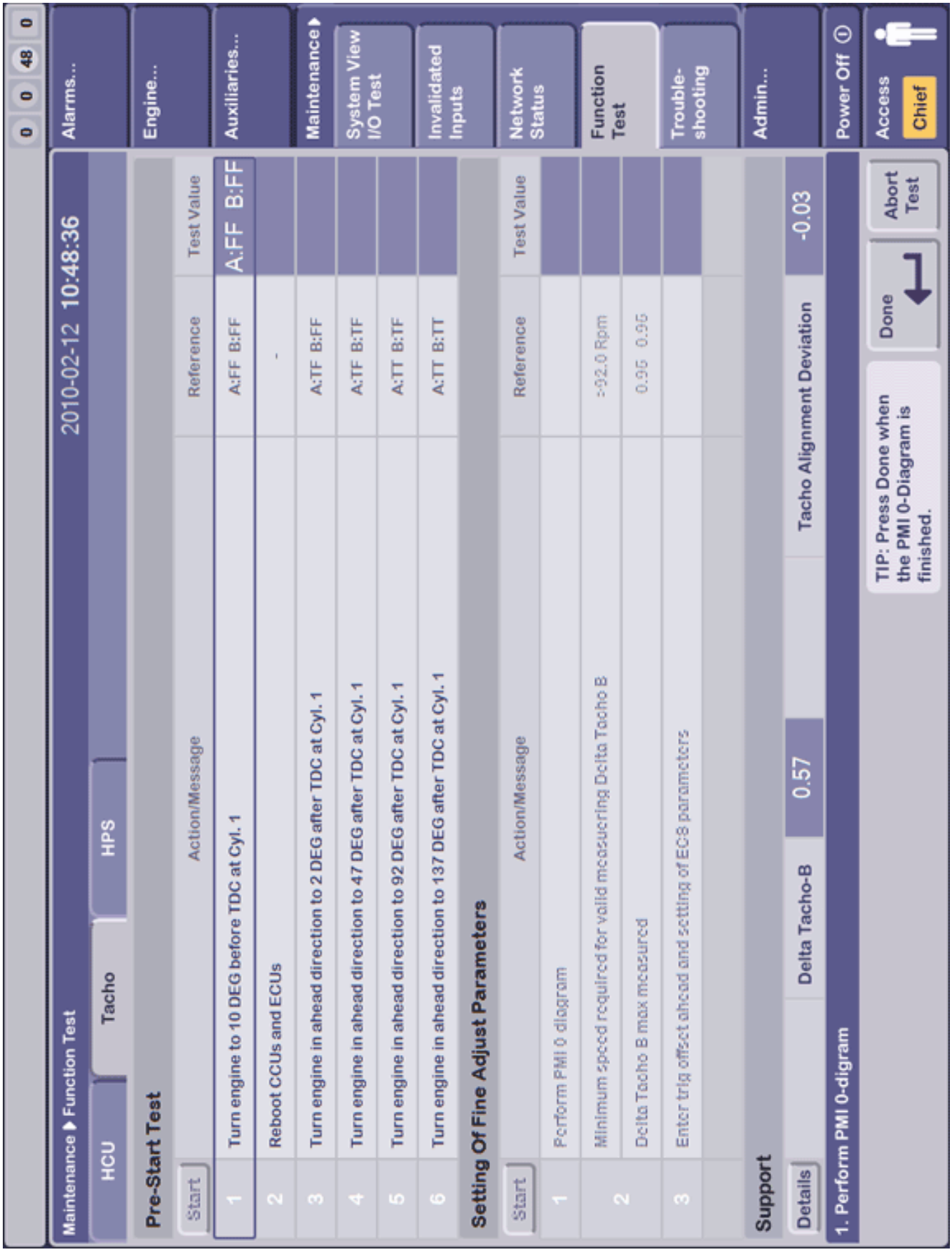

Admin ▸ Version
2010-02-12 10:58:07
Product Name & Version
ME-ECS-SW-1008-41
Engine Group No.
IMO No.
Engine Builder
Eng. No.
Controller Unit
Parameters Check Sums
ID Addr. Type User Chief Service Design IMO Design IMO Chief
ACU1 224 ACU 0 141 25470 3465 0 0
ACU2 225 ACU 0 141 25196 3431 0 0
ACU3 226 ACU 0 141 25234 3837 0 0
CCU1 240 CCU 0 746 39879 92461 26859 16571
CCU2 241 CCU 0 936 39639 92461 26859 16761
CCU3 242 CCU 0 984 39657 92461 26859 16809
CCU4 243 CCU 0 761 39868 92461 26859 16586
CCU5 244 CCU 0 1724 39670 92461 26859 17549
CCU6 245 CCU 0 1480 39657 92461 26859 17305
CCU7 246 CCU 0 914 39856 92461 26859 16739
CCU8 247 CCU 0 783 39699 92461 26859 16608
CCU9 248 CCU 0 1045 39639 92461 26859 16870
ECUA 208 ECU 0 11169 146281 79663 51961 64941
ECUB 209 ECU 0 11169 147670 79663 51961 64941
EICUA 192 EICU 0 122 110627 497 0 0
EICUB 193 EICU 0 123 105446 497 0 0
SCU1 239 SCU 0 478 43949 51872 15843 0
Export
TIP: Remove USB storage to save to HDD
USB & HDD E:\
Ready to save
Save
0 0 48 0
Alarms...
Engine...
Auxiliaries...
Maintenance...
Admin ▸
Set Time
Version
Power Off
Access
Chief

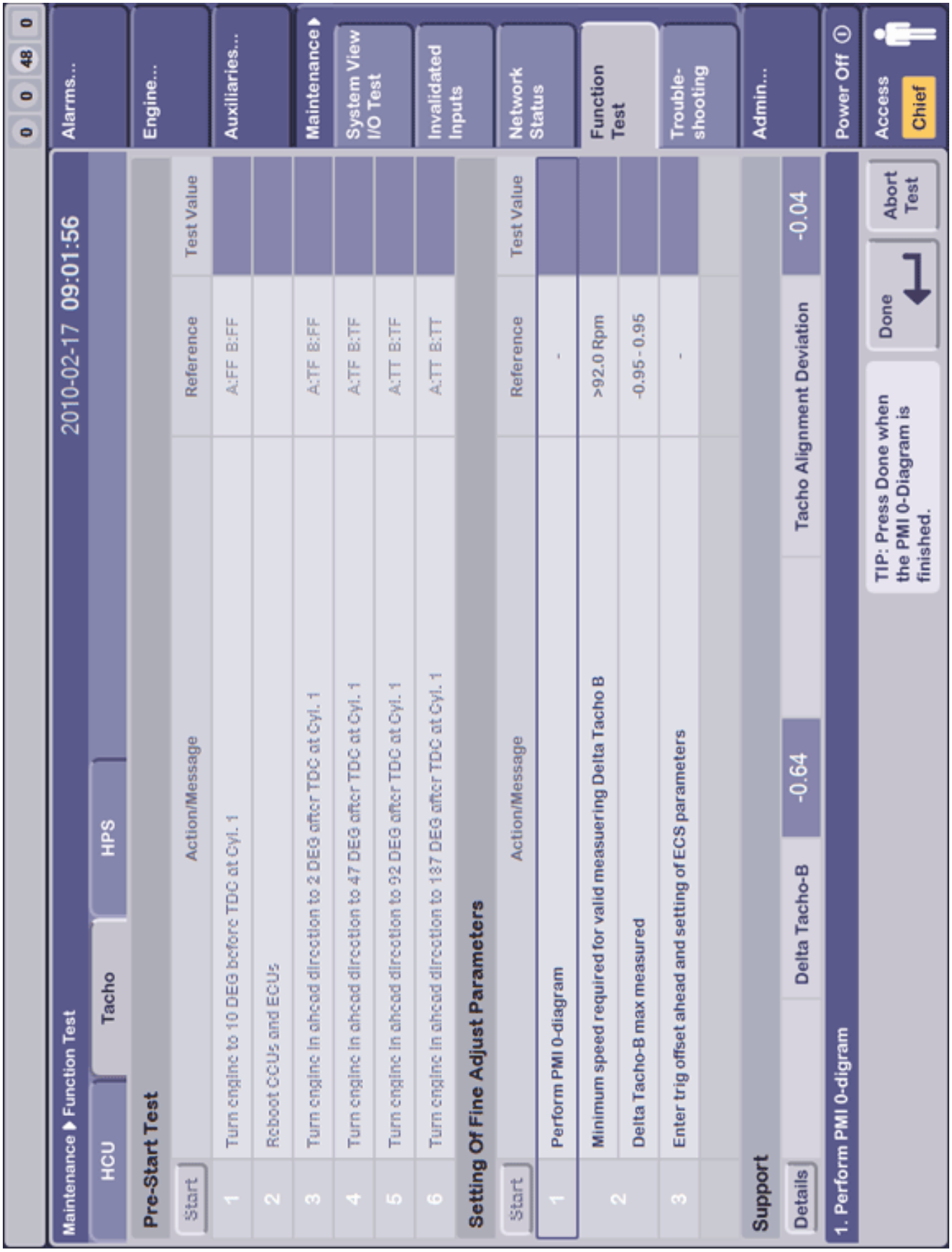

0 69 0 0
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ Function Test
2000-02-19 07:56:49
HCU
Tacho
HPS
Cylinder: 1 2 3 4 5 6 7 8 9 10 11 12
Preparation of HCU Test
Start
Action/Message
Reference
Test Value
1 Hydraulic and Fuel Pressure are present - OK
2 An assistant is standing by for listening to fuel injection and shockwave - OK
Test of FIVA-valve and calibration of Fuel Plunger
Start
Action/Message
Reference
Test Value
Test
1 Set CCU in test mode
2 Make an injection and evaluate sound -
3 Verify Fiva position (CH-30) 3.5 - 6.5 mA
Verify fuel plunger position (CH-31) 7.5 - 20.5 mA
Verify Fiva Amplifier (CH-33) 3.0 - 3.8 V
Verify Exhaust valve (CH-34) 3.5 - 11.5 mA
4 Open Exhaust valve and Evaluate sound -
5 Verify Fiva position (CH-30) 17.5 - 20.5 mA
Verify fuel plunger position (CH-31) 3.5 - 7.5 mA
Verify Fiva Amplifier (CH-33) -0.4 - 0.4 V
Reboot in Test Mode or Abort Test
WARNING!
Changing to TEST mode will STOP the MPC from controlling the system.
Reboot
Abort Test

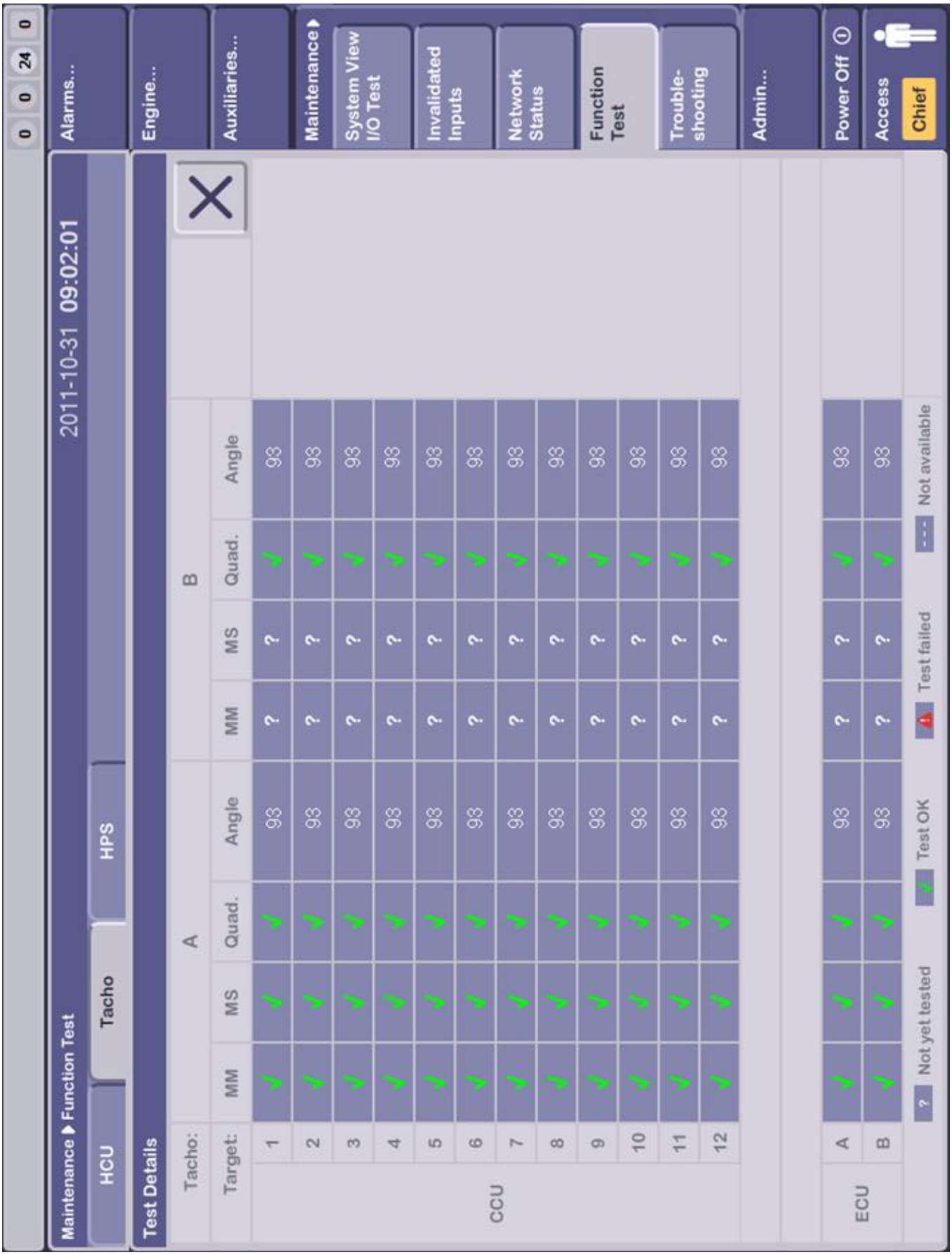

0
69
0
0
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ Function Test
2000-02-19 08:02:44
HCU
Tacho
HPS
Cylinder:
1
2
3
4
5
6
7
8
9
10
11
12
Test of FIVA-valve and calibration of Fuel Plunger
Start
Action/Message
Reference
Test
Test Value
1 Set CCU in test mode
2 Make an injection and evaluate sound
3 Verify Fiva position (CH-30) 3.5 - 6.5 mA
Verify fuel plunger position (CH-31) 7.5 - 20.5 mA
Verify Fiva Amplifier (CH-33) 3.0 - 3.8 V
Verify Exhaust valve (CH-34) 3.5 - 11.5 mA
4 Open Exhaust valve and Evaluate sound -
5 Verify Fiva position (CH-30) 17.5 - 20.5 mA
Verify fuel plunger position (CH-31) 3.5 - 7.5 mA
Verify Fiva Amplifier (CH-33) -0.4 - 0.4 V
Verify Exhaust valve (CH-34) 12.5 - 20.5 mA
6 Save fuel plunger sensor calibration -
Amplifier Test
Start
Action/Message
Reference
Test Value
Done
Abort Test
Accept and proceed to next test step

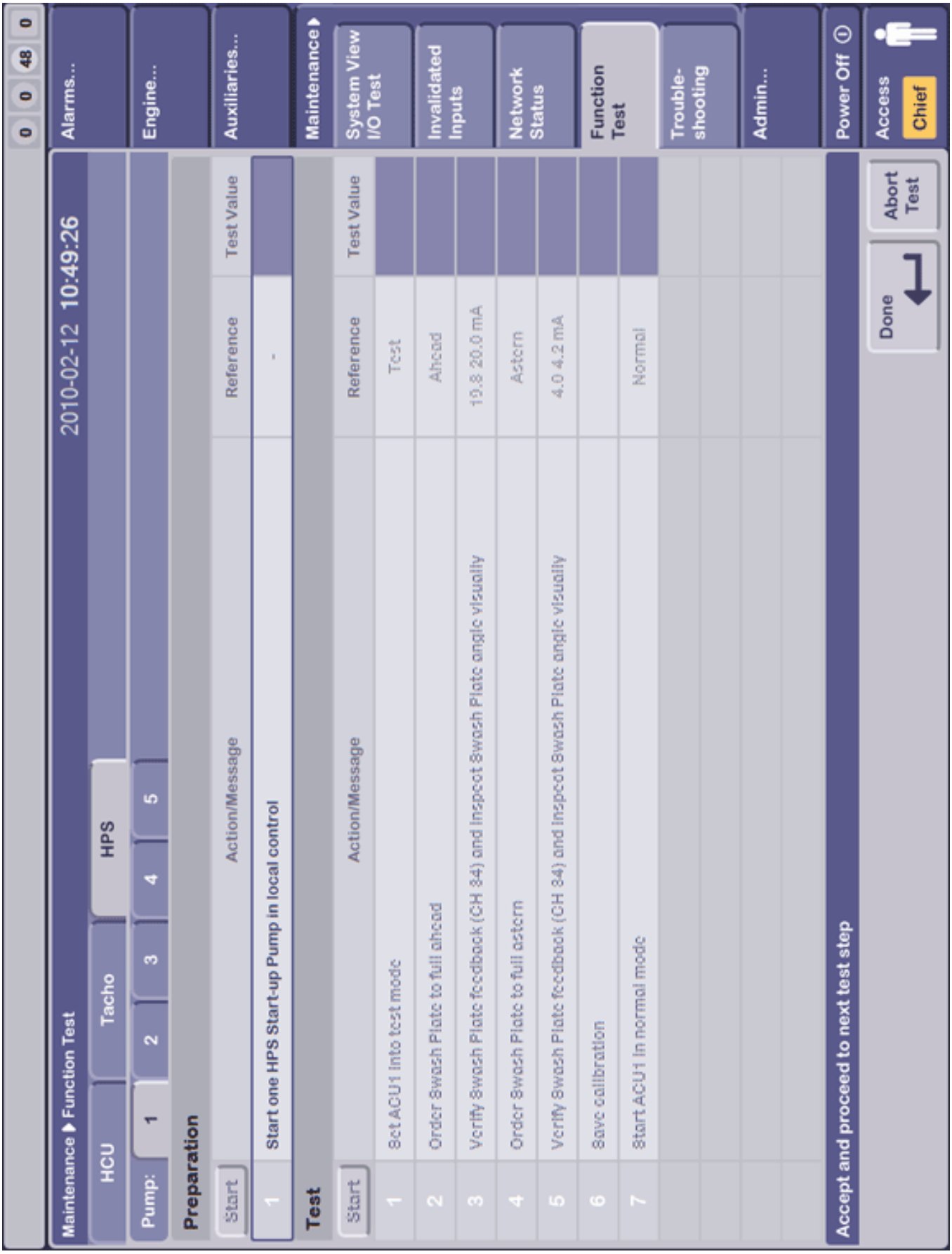

Maintenance ▸ Function Test
2000-02-19 08:05:36
HCU
Tacho
HPS
Cylinder:
1
2
3
4
5
6
7
8
9
10
11
12
5
Verify fuel plunger position (CH-31)
3.5 - 7.5 mA
Verify Fiva Amplifier (CH-33)
-0.4 - 0.4 V
Verify Exhaust valve (CH-34)
12.5 - 20.5 mA
6
Save fuel plunger sensor calibration
-
Amplifier Test
Start
Action/Message
Reference
Test Value
1
Set CCU in test mode
Test
2
Adjust output (CH-70) value and press set
-3.6 - 3.6 V
Verify read back on input (CH-33)
-0.8 - -0.4 V
Cyclic Test of Exhaust valve and/or make single fuel injections
Start
Action/Message
Reference
Test Value
1
Set CCU in test mode
Test
2
Start/Stop cyclic test of Exhaust Valve and make single injections
-
End test
Start
Action/Message
Reference
Test Value
1
Set CCU in Normal Mode
Normal
Accept and proceed to next test step
Alarms...
Engine...
Auxiliaries...
Maintenance ▸
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Abort Test
Done
0
69
0
0

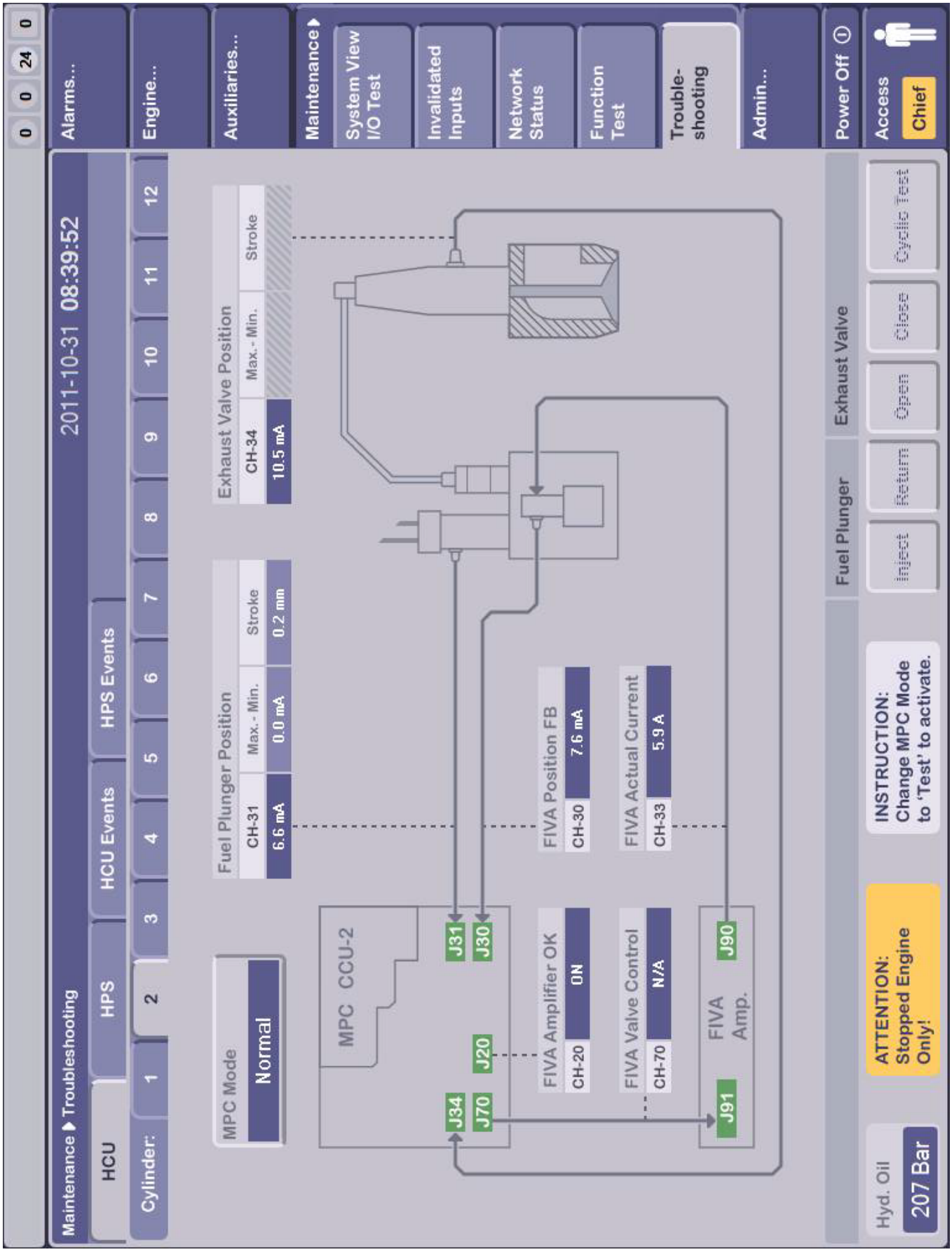

0
2
24
0
Maintenance ▸ Function Test
2011-10-31 09:12:19
HCU
Tacho
HPS
Cylinder:
1
2
3
4
5
6
7
8
9
10
11
12
5
Verify fuel plunger position (CH-31)
3.5 - 8.0 mA
7.4 mA
Verify Fiva Amplifier (CH-33)
-0.2 - 0.2 V
0.0 V
Verify Exhaust valve (CH-34)
10.0 - 20.5 mA
10.5 mA
6
Save fuel plunger sensor calibration
-
OK
Amplifier Test
Start
Action/Message
Reference
Test Value
1
Set CCU in test mode
Test
Test
2
Adjust output (CH-70) value and press set
-3.6 - 3.6 V
0.5 V
Verify read back on input (CH-33)
0.4 - 0.6 V
0.5 V
Cyclic Test of Exhaust valve and/or make single fuel injections
Start
Action/Message
Reference
Test Value
1
Set CCU in test mode
Test
2
Start/Stop cyclic test of Exhaust Valve and make single injections
-
End test
Start
Action/Message
Reference
Test Value
1
Set CCU in Normal Mode
Normal
Set value of CH-70 [V]
Current
0.5
New
0.5
Set
Done
Alarms...
Engine...
Auxiliaries...
Maintenance ▸
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief

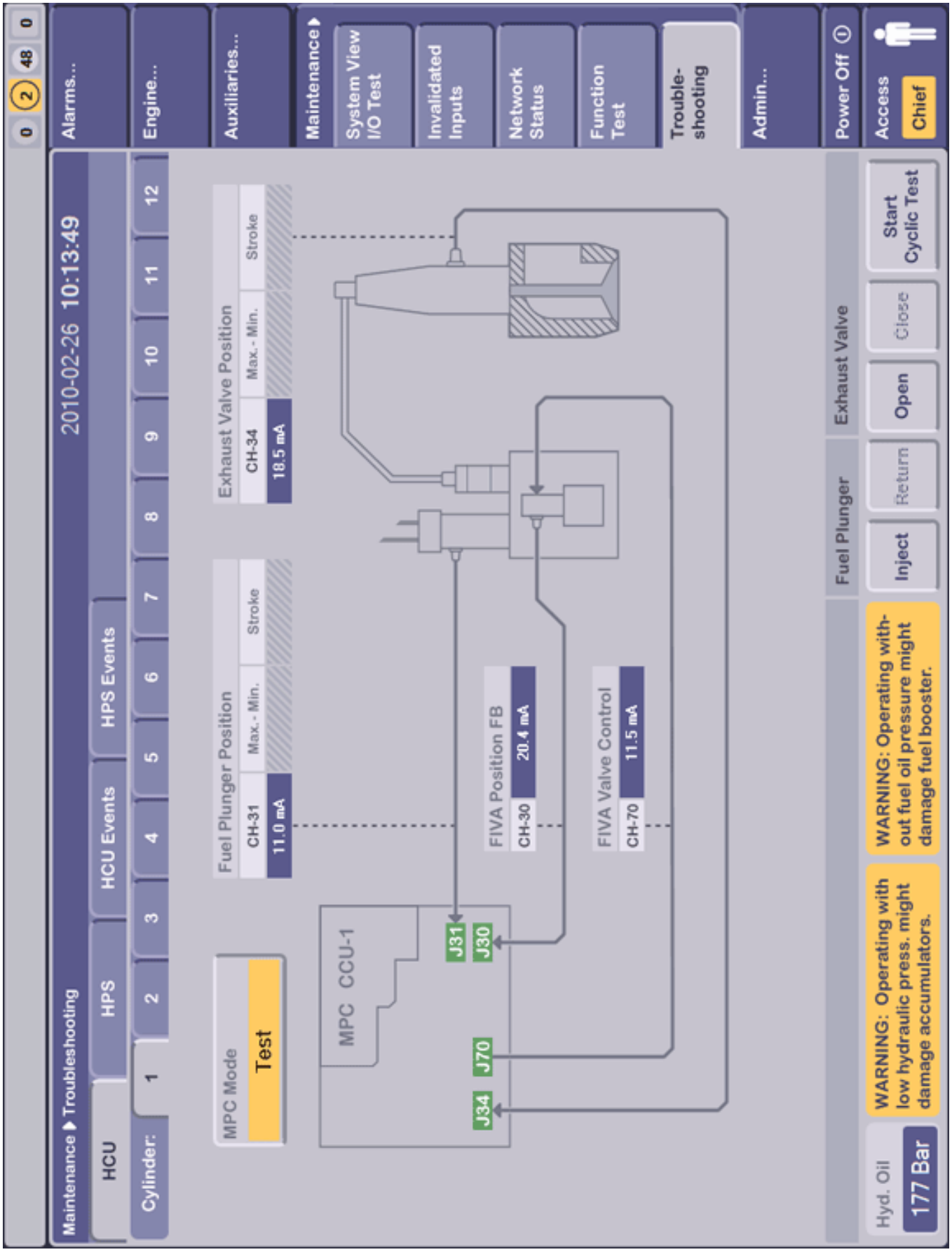

0 0 48 0
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▶ Function Test
2010-02-12 10:48:36
HCU
Tacho
HPS
Pre-Start Test
Start
Action/Message
Reference
Test Value
1 Turn engine to 10 DEG before TDC at Cyl. 1 A:FF B:FF A:FF B:FF
2 Reboot CCUs and ECUs -
3 Turn engine in ahead direction to 2 DEG after TDC at Cyl. 1 A:TF B:FF
4 Turn engine in ahead direction to 47 DEG after TDC at Cyl. 1 A:TF B:TF
5 Turn engine in ahead direction to 92 DEG after TDC at Cyl. 1 A:TT B:TF
6 Turn engine in ahead direction to 137 DEG after TDC at Cyl. 1 A:TT B:TT
Setting Of Fine Adjust Parameters
Start
Action/Message
Reference
Test Value
1 Perform PMI 0 diagram
2 Minimum speed required for valid measuring Delta Tacho B ≈92.0 Rpm
Delta Tacho B max measured 0.95 0.95
3 Enter trig offset ahead and setting of EC8 parameters
Support
Details
Delta Tacho-B 0.57
Tacho Alignment Deviation -0.03
1. Perform PMI 0-digram
TIP: Press Done when the PMI 0-Diagram is finished.
Done
Abort Test

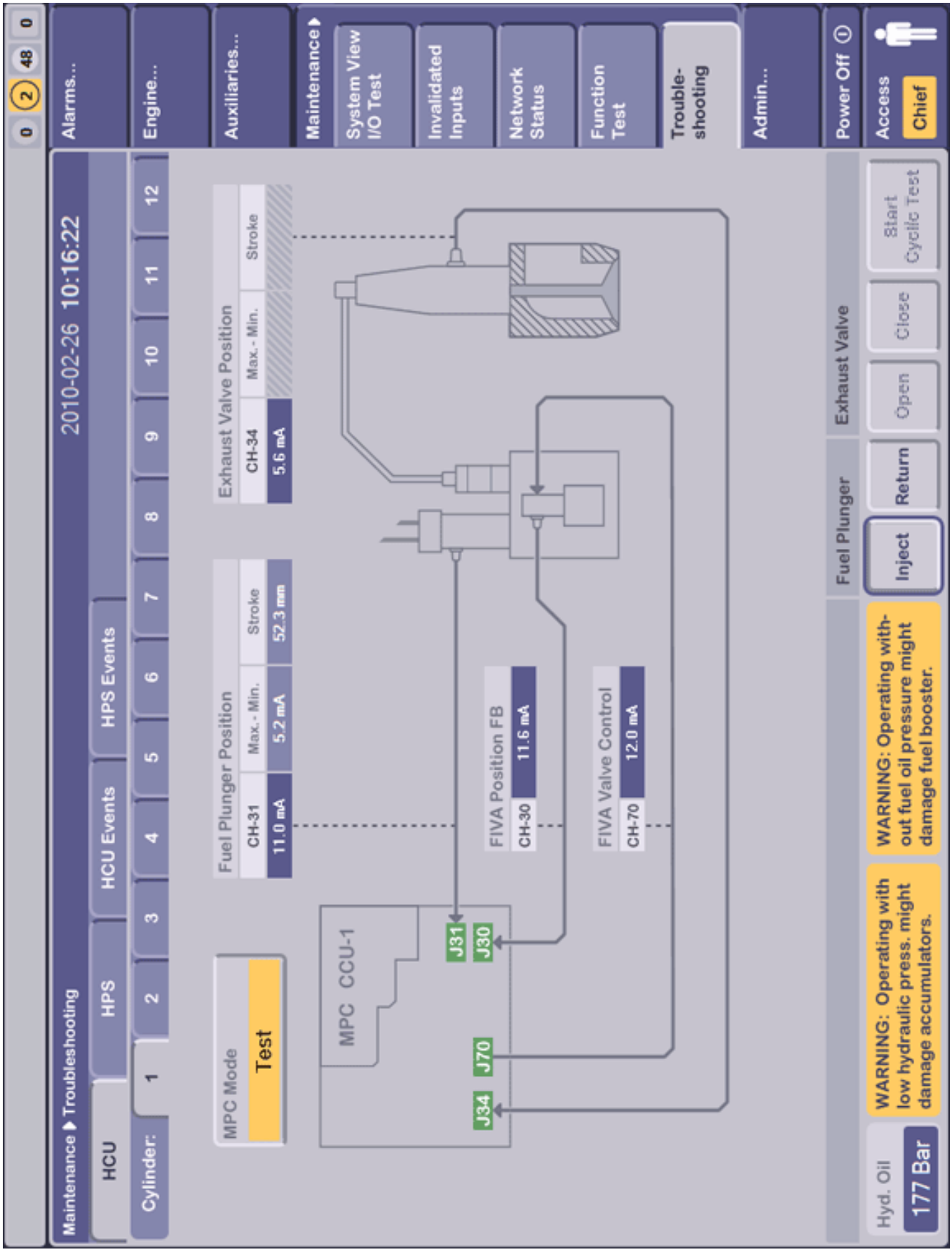

0 0 48 0
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ Function Test
2010-02-17 09:01:56
HCU
Tacho
HPS
Pre-Start Test
Start
Action/Message
Reference
Test Value
1 Turn engine to 10 DEG before TDC at Cyl. 1
2 Reboot CCUs and ECUs
3 Turn engine in ahead direction to 2 DEG after TDC at Cyl. 1 A:TF B:FF
4 Turn engine in ahead direction to 47 DEG after TDC at Cyl. 1 A:TF B:TF
5 Turn engine in ahead direction to 92 DEG after TDC at Cyl. 1 A:TT B:TF
6 Turn engine in ahead direction to 187 DEG after TDC at Cyl. 1 A:TT B:TT
Setting Of Fine Adjust Parameters
Start
Action/Message
Reference
Test Value
1 Perform PMI 0-diagram -
2 Minimum speed required for valid measuering Delta Tacho B >92.0 Rpm
Delta Tacho-B max measured -0.95 - 0.95
3 Enter trig offset ahead and setting of ECS parameters -
Support
Details
Delta Tacho-B -0.64
Tacho Alignment Deviation -0.04
1. Perform PMI 0-digram
TIP: Press Done when the PMI 0-Diagram is finished.
Done
Abort Test

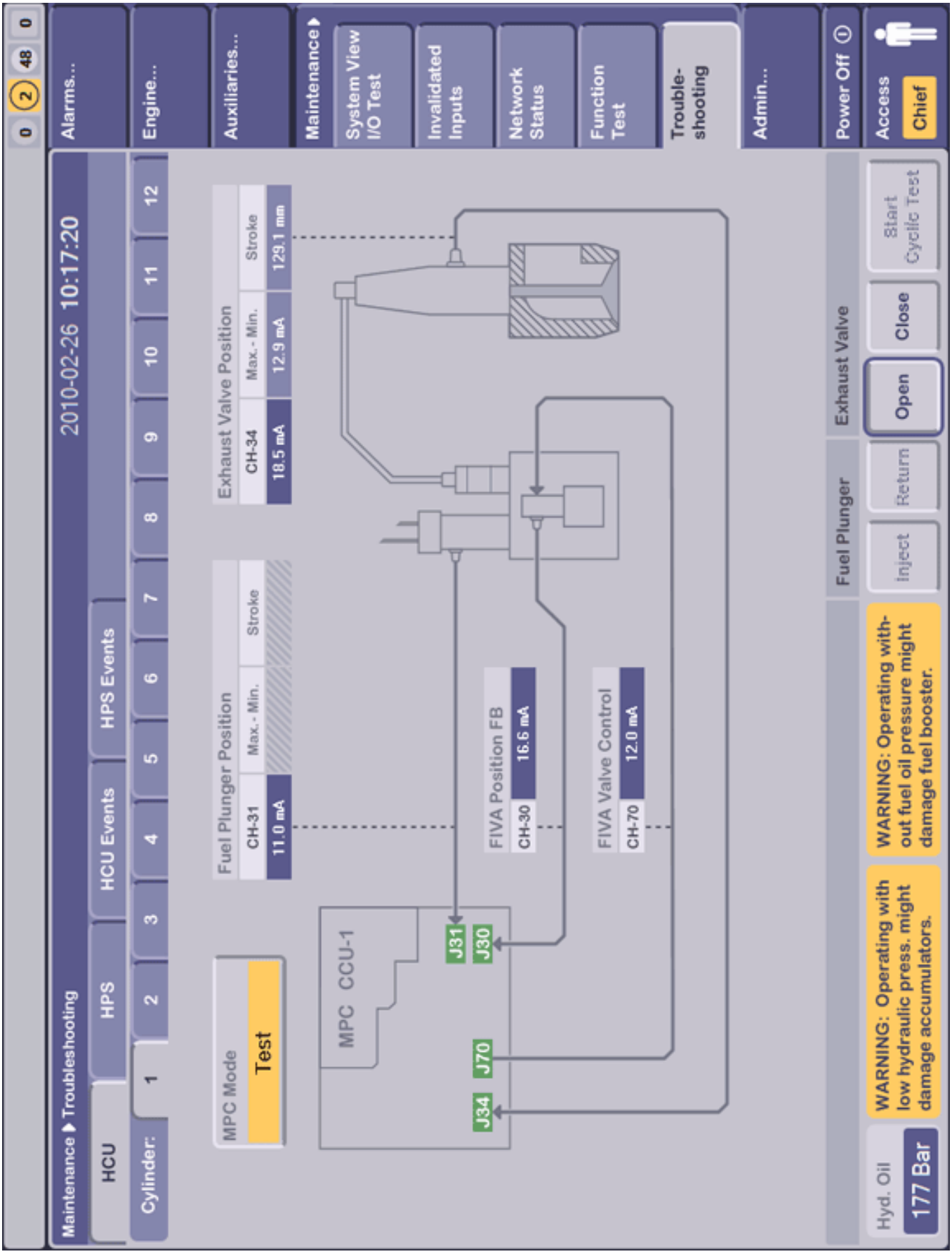

0 0 24 0
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ Function Test
2011-10-31 09:02:01
HCU
Tacho
HPS
Test Details
Tacho:
Target:
A
B
MM
MS
Quad.
Angle
CCU
ECU
Not yet tested
Test OK
Test failed
Not available

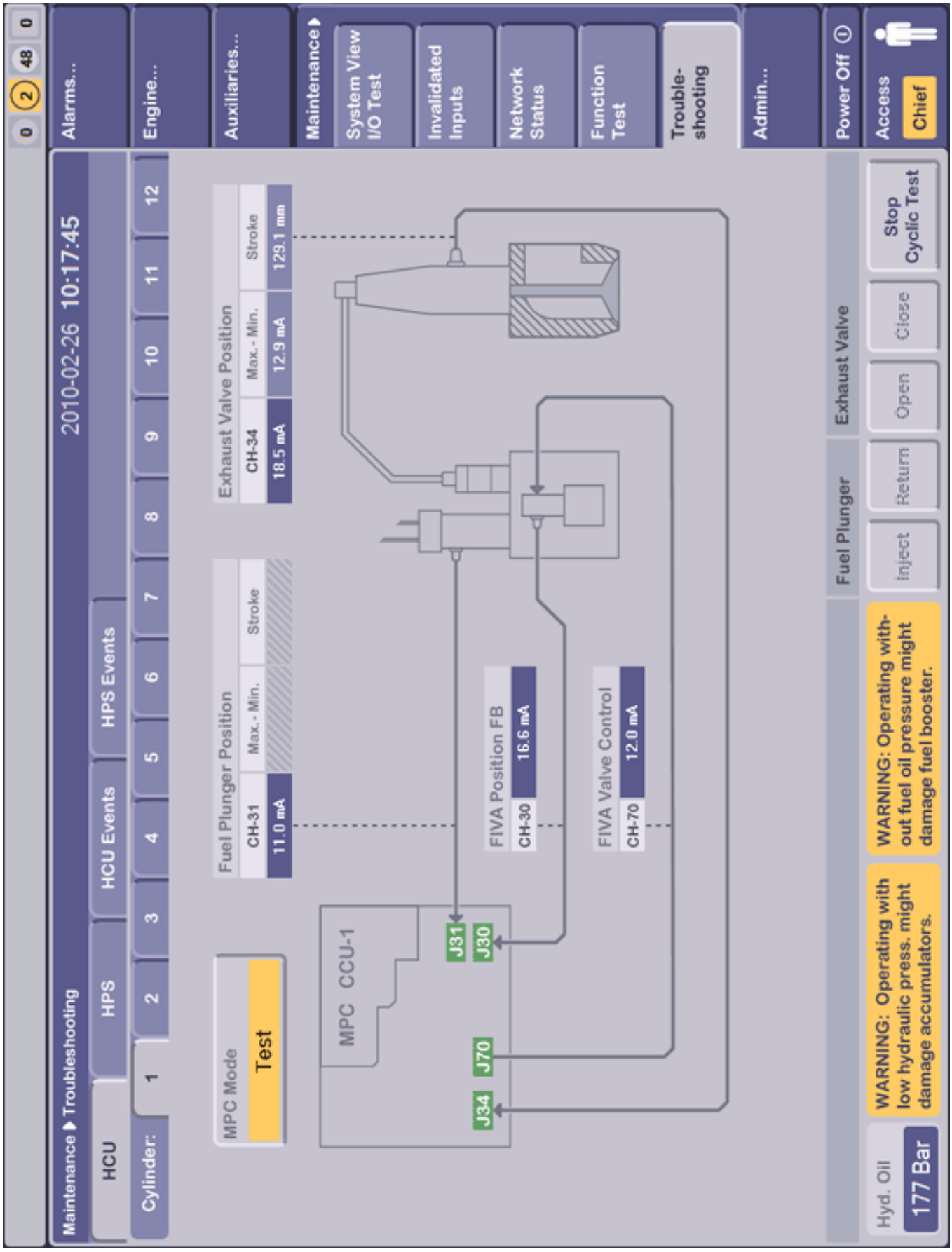

0 0 48 0
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ Function Test
2010-02-12 10:49:26
HCU
Tacho
HPS
Pump: 1 2 3 4 5
Preparation
Start
Action/Message
Reference
Test Value
1 Start one HPS Start-up Pump in local control -
Test
Start
Action/Message
Reference
Test Value
1 Set ACU1 into test mode Test
2 Order Swash Plate to full ahead Ahead
3 Verify Swash Plate feedback (CH 84) and inspect Swash Plate angle visually 19.8 20.0 mA
4 Order Swash Plate to full astern Astern
5 Verify Swash Plate feedback (CH 84) and inspect Swash Plate angle visually 4.0 4.2 mA
6 Save calibration
7 Start ACU1 in normal mode Normal
Done
Abort Test
Accept and proceed to next test step

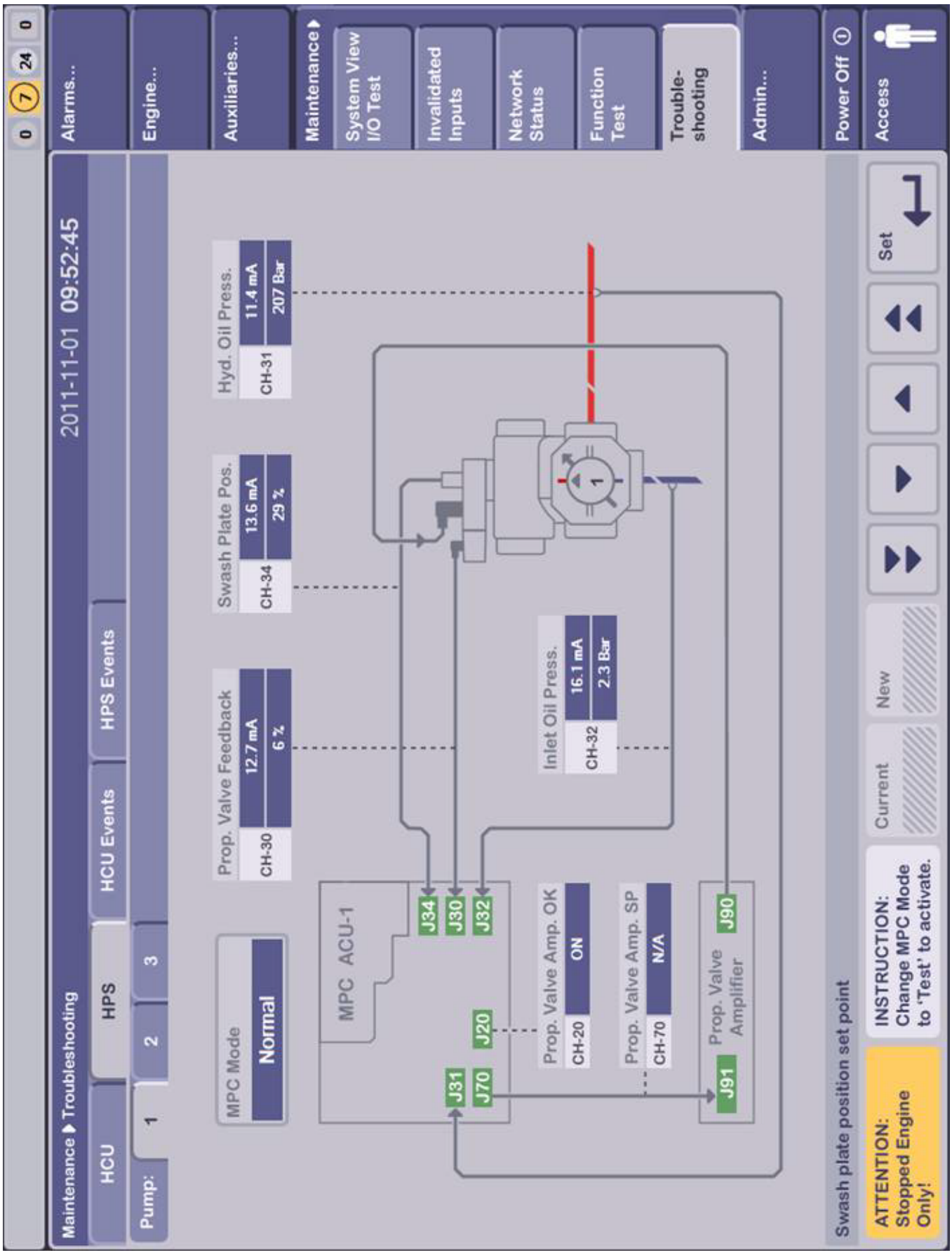

0 0 24 0
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ Troubleshooting
2011-10-31 08:39:52
HCU
HPS
HCU Events
HPS Events
Cylinder: 1 2 3 4 5 6 7 8 9 10 11 12
MPC Mode
Normal
Fuel Plunger Position
CH-31
Max. - Min.
Stroke
6.6 mA
0.0 mA
0.2 mm
Exhaust Valve Position
CH-34
Max. - Min.
Stroke
10.5 mA
MPC CCU-2
J31
J30
J20
J34
J70
FIVA Amplifier OK
CH-20
ON
FIVA Position FB
CH-30
7.6 mA
FIVA Valve Control
CH-70
N/A
FIVA Actual Current
CH-33
5.9 A
FIVA Amp.
J90
J91
ATTENTION: Stopped Engine Only!
INSTRUCTION: Change MPC Mode to 'Test' to activate.
Fuel Plunger
Exhaust Valve
Inject
Return
Open
Close
Cycle Test
Hyd. Oil
207 Bar

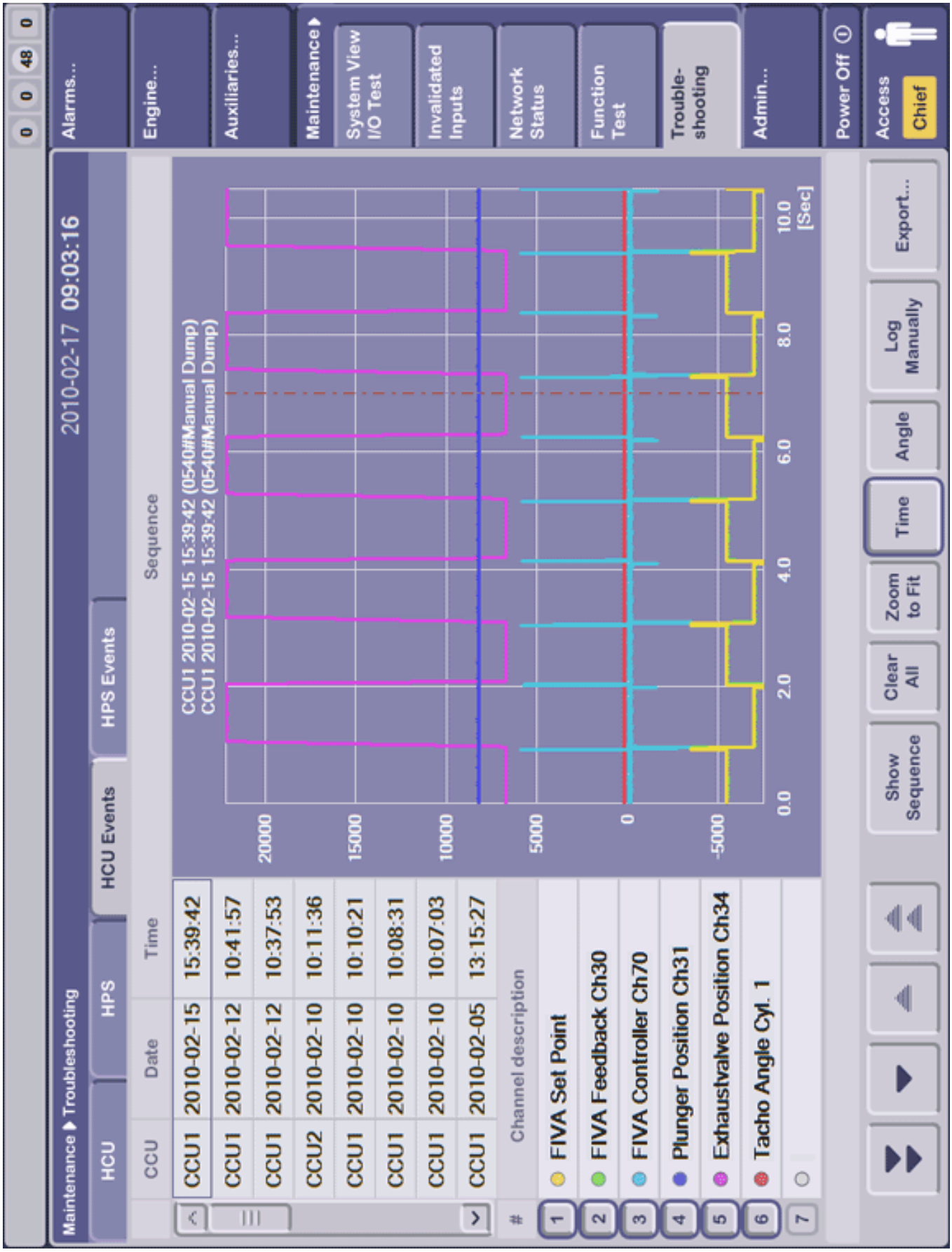

0 2 48 0
Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▶ Troubleshooting
2010-02-26 10:13:49
HCU
HPS
HCU Events
HPS Events
Cylinder: 1 2 3 4 5 6 7 8 9 10 11 12
MPC Mode
Test
Fuel Plunger Position
CH-31
Max.- Min.
Stroke
11.0 mA
Exhaust Valve Position
CH-34
Max.- Min.
Stroke
18.5 mA
FIVA Position FB
CH-30
20.4 mA
FIVA Valve Control
CH-70
11.5 mA
MPC CCU-1
J31
J30
J70
J34
Fuel Plunger
Exhaust Valve
Inject
Return
Open
Close
Start Cyclic Test
Hyd. Oil
177 Bar
WARNING: Operating with low hydraulic press. might damage accumulators.
WARNING: Operating with-out fuel oil pressure might damage fuel booster.


Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ Troubleshooting
2010-02-26 10:16:22
HCU
HPS
HCU Events
HPS Events
Cylinder:
1 2 3 4 5 6 7 8 9 10 11 12
MPC Mode
Test
Fuel Plunger Position
CH-31
Max.- Min.
Stroke
11.0 mA
5.2 mA
52.3 mm
Exhaust Valve Position
CH-34
Max.- Min.
Stroke
5.6 mA
FIVA Position FB
CH-30
11.6 mA
FIVA Valve Control
CH-70
12.0 mA
MPC CCU-1
J31
J30
J70
J34
Fuel Plunger
Exhaust Valve
Inject
Return
Open
Close
Start Cyclic Test
WARNING: Operating with low hydraulic press. might damage accumulators.
WARNING: Operating without fuel oil pressure might damage fuel booster.
Hyd. Oil
177 Bar


Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
2010-02-26 10:17:20
Maintenance ▸ Troubleshooting
HCU
HPS
HCU Events
HPS Events
Cylinder:
1 2 3 4 5 6 7 8 9 10 11 12
MPC Mode
Test
Fuel Plunger Position
CH-31
Max.- Min.
Stroke
11.0 mA
Exhaust Valve Position
CH-34
Max.- Min.
Stroke
18.5 mA
12.9 mA
129.1 mm
MPC CCU-1
J31
J30
J70
J34
FIVA Position FB
CH-30
16.6 mA
FIVA Valve Control
CH-70
12.0 mA
Fuel Plunger
Exhaust Valve
Inject
Return
Open
Close
Start Cyclic Test
Hyd. Oil
177 Bar
WARNING: Operating with low hydraulic press. might damage accumulators.
WARNING: Operating with-out fuel oil pressure might damage fuel booster.


Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
Maintenance ▸ Troubleshooting
2010-02-26 10:17:45
HCU
HPS
HCU Events
HPS Events
Cylinder:
1 2 3 4 5 6 7 8 9 10 11 12
MPC Mode
Test
Fuel Plunger Position
CH-31
Max. - Min.
Stroke
11.0 mA
Exhaust Valve Position
CH-34
Max. - Min.
Stroke
18.5 mA
12.9 mA
129.1 mm
MPC CCU-1
J31
J30
J70
J34
FIVA Position FB
CH-30
16.6 mA
FIVA Valve Control
CH-70
12.0 mA
Fuel Plunger
Exhaust Valve
Inject
Return
Open
Close
Stop Cyclic Test
WARNING: Operating with low hydraulic press. might damage accumulators.
WARNING: Operating without fuel oil pressure might damage fuel booster.
Hyd. Oil
177 Bar


Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
2011-11-01 09:52:45
Maintenance ▸ Troubleshooting
HCU
HPS
HCU Events
HPS Events
Pump:
1
2
3
MPC Mode
Normal
MPC ACU-1
Prop. Valve Feedback
12.7 mA
6 %
CH-30
Swash Plate Pos.
13.6 mA
29 %
CH-34
Hyd. Oil Press.
11.4 mA
207 Bar
CH-31
Inlet Oil Press.
16.1 mA
2.3 Bar
CH-32
J34
J30
J32
J20
J31
J70
Prop. Valve Amp. OK
ON
CH-20
Prop. Valve Amp. SP
N/A
CH-70
Prop. Valve Amplifier
J90
J91
Swash plate position set point
Current
New
Set
ATTENTION: Stopped Engine Only!
INSTRUCTION: Change MPC Mode to 'Test' to activate.


Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
2010-02-17 09:03:16
Maintenance ▸ Troubleshooting
HCU
HPS
HCU Events
HPS Events
Sequence
CCU1 2010-02-15 15:39:42 (0540#Manual Dump)
CCU1 2010-02-15 15:39:42 (0540#Manual Dump)
20000
15000
10000
5000
0
-5000
0.0
2.0
4.0
6.0
8.0
10.0
[Sec]
CCU
Date
Time
CCU1 2010-02-15 15:39:42
CCU1 2010-02-12 10:41:57
CCU1 2010-02-12 10:37:53
CCU2 2010-02-10 10:11:36
CCU1 2010-02-10 10:10:21
CCU1 2010-02-10 10:08:31
CCU1 2010-02-10 10:07:03
CCU1 2010-02-05 13:15:27
#
Channel description
1 FIVA Set Point
2 FIVA Feedback Ch30
3 FIVA Controller Ch70
4 Plunger Position Ch31
5 Exhaustvalve Position Ch34
6 Tacho Angle Cyl. 1
7
Show Sequence
Clear All
Zoom to Fit
Time
Angle
Log Manually
Export...


Alarms...
Engine...
Auxiliaries...
Maintenance
System View I/O Test
Invalidated Inputs
Network Status
Function Test
Trouble-shooting
Admin...
Power Off
Access
Chief
2010-02-17 09:05:06
Maintenance ▸ Troubleshooting
HCU
HPS
HCU Events
HPS Events
Sequence
ACU2 2010-02-01 11:12:30 (070119#Pump ctrl failure)
ACU2 2010-02-16 13:31:21 (070119#Pump ctrl failure)
ACU2 2010-02-09 10:29:38 (070119#Pump ctrl failure)
ACU2 2010-02-01 11:10:01 (070119#Pump ctrl failure)
30000
25000
20000
15000
10000
5000
0
0.00
2.00
4.00
6.00
8.00
[Sec]
ACU
Date
Time
ACU2 2010-02-01 11:12:02
ACU2 2010-02-01 11:11:15
ACU2 2010-02-01 11:10:40
ACU2 2010-02-01 11:10:01
ACU2 2010-02-01 11:09:41
ACU2 2010-02-01 11:08:56
ACU2 2010-02-01 10:58:51
ACU2 2010-02-01 10:56:58
Channel description
1 Hydraulic Pressure Setpoint
2 Hydraulic Pressure Ch31
3 SwashPlate Setpoint
4 SwashPlate Position Ch34
5 Internal Propvalve Setpoint
6 Int. Propvalve Position Ch30
7 Controler Output Ch70
Show Sequence
Clear All
Zoom to Fit
Log Manually
Export...