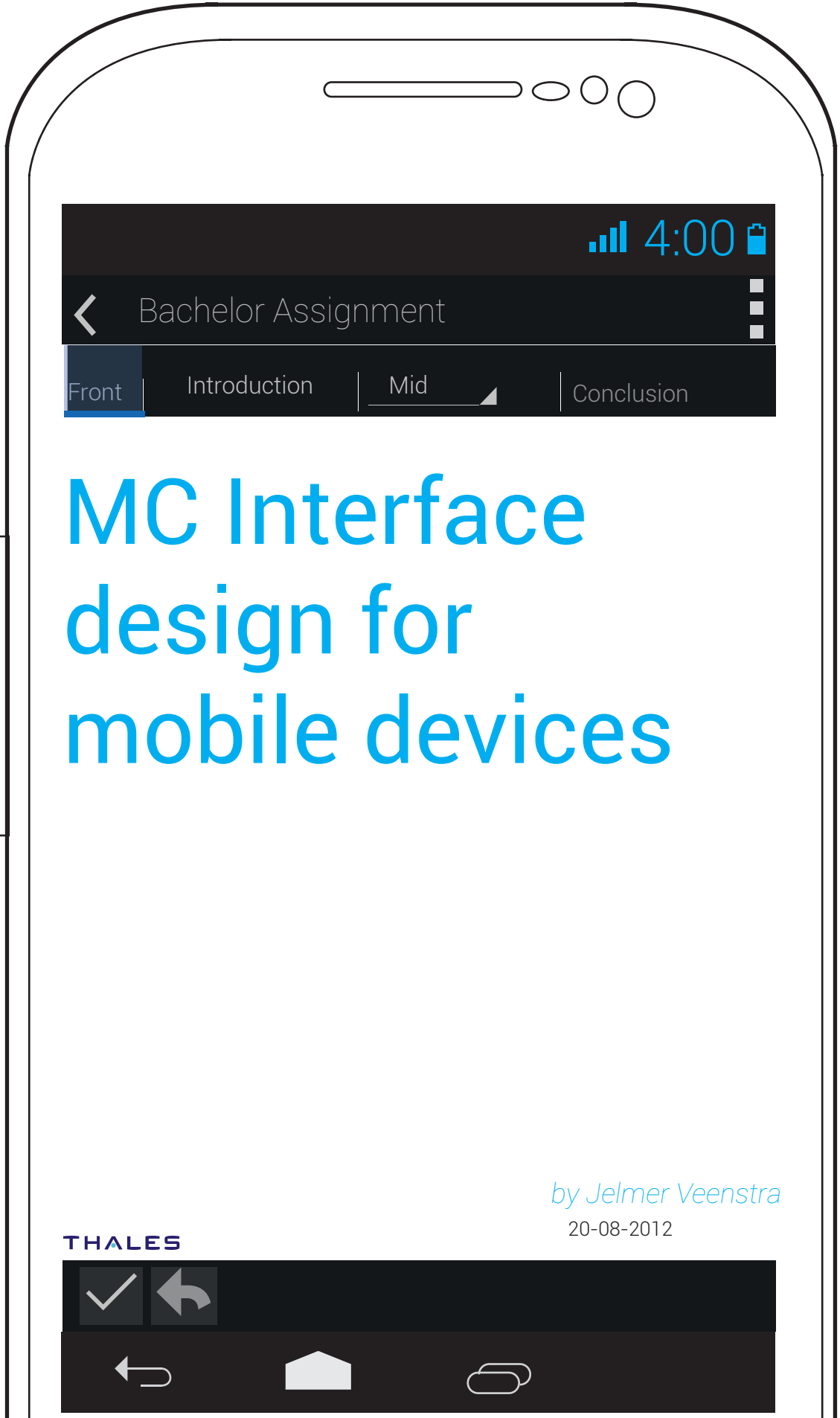


MC Interface design for mobile devices

by Jelmer Veenstra

20-08-2012

THALES

CONTENTS

1 PREFACE

<Introduction>

This document will describe the execution of my bachelor assignment. This is the final assignment in the Industrial Design Bachelor at the University of Twente. The bachelor assignment is preferably an internship at a company. I was given the opportunity to perform my internship at Thales Hengelo. Thales Hengelo is branch of the international Thales Group organisation, a multinational company with more than 67.000 employees operating in 50 countries. Thales Group operates in two major sectors: Defence&Security and Aerospace&Transport. Thales Hengelo specializes in Defence&Security surveillance systems{20}. During my internship period, I have tried to bring my study gained knowledge into practise. The goal of this bachelor assignment is to autonomously work on a given assignment in a corporate environment with a distinct end result. This end result shall be a prototype or end conclusion. The assignment is supervised by both an institution and a Thales provided supervisor. These supervisors are to guide my process during the internship and assess the end result.

<Assignment>

Thales Group Hengelo manufactures and produces defence and security systems. These systems are mainly radar and optical sensors systems. For the maintenance on the Thales's Integrated-mast(I-mast) system, a Maintenance Centre (MC) application has been developed by Thales. Section 3:Systems of this report will describe the I-Mast in more detail. With the MC, a maintainer can monitor the health and availability of the system by using the MC. When the system malfunctions, the maintainer can alter the system state and with the information provided by the MC, identify, locate and replace the malfunctioning parts. This application and its Graphical User Interface(GUI) is designed for a fixed resolution screen. Thales Hengelo developed multiple interfaces for their different radar and optical systems present in the I-mast. To give every MC the same look and feel, a guideline document has been established. These guidelines describe how the MC GUI should look and feel, who its users are, the use environments of the MC, what hardware it's uses and to which interfaces the MC is connected.

The goal of this assignment is to increase flexibility of the MC application in order to support a wider range of mobile devices, like a smartphone or tablets. The current MC application is defined by fixed dimensions. Meaning that it only suitable for a specific screen resolution and size. It isn't scaleable. Therefore the transformation to flexible screen size and resolution, new guidelines have to be established. To present and prove these guidelines, a prototype shall be developed based on these new guidelines. This is a proof of concept prototype and does not support the complete interface functionality.

<Approach>

For the establishment of new guidelines, research has to be done on the system, the users, the current guidelines, the general existing User-Interface guidelines, platform OS guidelines and target platform. After the research phase, the actual interface design can commence. The interface design in combination with the new guidelines will be the foundation of the prototype development.
The progress and direction of my bachelor assignment is going to be monitored by both supervisors. The design process is described in the next chapter.

The design process has been monitored by weekly meetings. In these meetings, the previous weeks work was accessed by the Thales supervisors. Also the direction for the next weeks work was determined. In addition to those weekly meetings, there have been time irregular timed meetings where MC experts were present and more important decisions were made. The weekly meetings were informal and attended by one or two supervisors. The meeting was taking place around the normal work environment where the made work in the previous was presented. The time irregular meetings were formal and took place in a meeting room with presentation equipment(beamer, large touchscreen). The meetings identified problems, solved them or discovered additional opportunities. All the feedback from the meetings helped speed up the design process significantly.

The first month of the bachelor assignment consisted mainly of research on the system, current MC, current MC users and possible new hardware platforms with their own interface design guidelines. Also it helped clarify and list the followings problems:

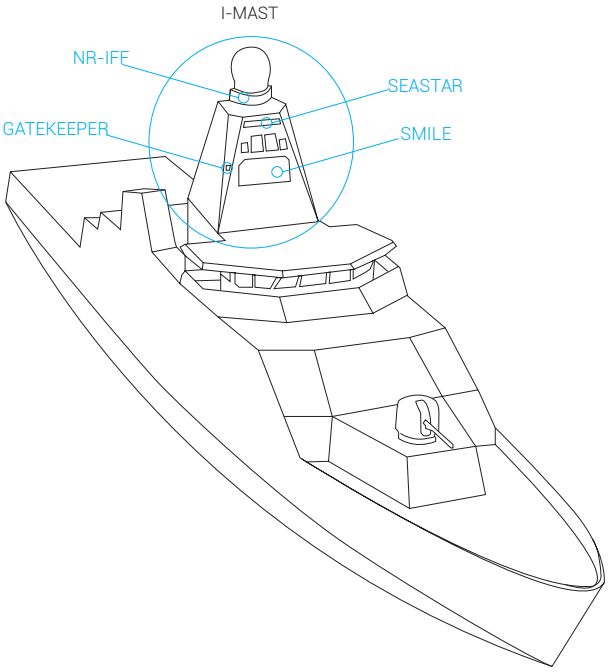
1. What is the role of the mobile MC?
2. Differences between smartphones and tabets.
3. Functionality of the mobile MC?

The second month, or phase, was the beginning of the interface design. With the new found information, the interface concept design and feedback, the above listed problems were answered. The new guidelines document was also established in this phase.

During the third phase, the new guidelines were further refined with the help of the feedback and the development of the prototype. The prototype development gave a better understanding in the OS possibilities and restrictions. For the development of the prototype a new language had to be learned and the development platform: Eclipse. This phase finalized in the final new guidelines document and the interface prototype.

3 SYSTEMS

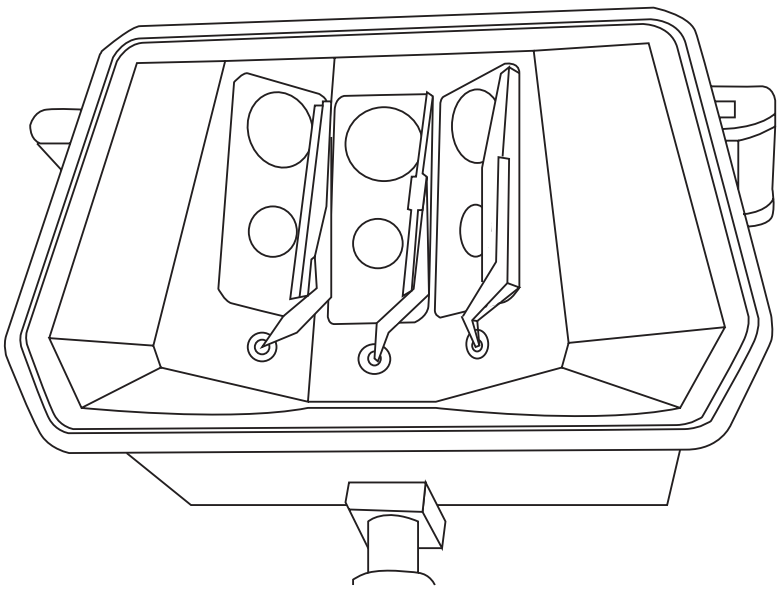
This chapter will describe the following surveillance systems: SEASTAR, Gatekeeper, NR-IFF, and SMILE. These system are integrated in the I-Mast. The I-Mast integrates the above listed systems into one “plug&play“ surveillance mast. With the I-Mast a ship manufacturing process can significantly be increased. For the I-mast a coordinating MC has been made, which shows the global functioning of the four systems and allows the user to select a desired MC . A schematic view below shows where the four system are located on the I-mast. The main goals of the system is providing a view of the surroundings and protection against unidentified threats. The system can also track potential harmful targets and feed this information to the weapons systems on the ship.



//I-Mast mounted on ship

<Gatekeeper>

The Gatekeeper is an optical surveillance camera system providing a panoramic 360 view. It specialises in tracking close targets, like swimmers and small boats. It is the ships last line of defence against targets that can not be identified by the various radar systems in the I-mast. The Gatekeeper consists of 4 Sensor Heads which each contain 3 TV camera's and 3 IR cameras. This data is sent to the processing cabinet in a lower deck of the I-mast. A processing cabinet is a cabinet filled with high-end military grade computers and storage devices. A schematic overview of the Gatekeeper's total system can be found in appendix chapter 1:Gatekeeper system diagram. The processed information is sent to the Combat Management System(CMS) and the Maintenance Centre(MC). This systems operation is limited by weather conditions. The CMS analyses the tracks and plots from the Sensor Heads and decide if immediate action is required. A schematic overview of the Gatekeeper sensor head unit is given below.



//Gatekeeper unit

<SEASTAR>

The SEASTAR is a radar surveillance system specialized in tracking short-distance(80 m - 40 km) objects like missiles and small objects like rib boots. Unlike the Gatekeeper, the SEASTAR is a radar sensor based surveillance system. The system consists of 4 antennas and 2 processing cabinets. The SEASTAR is located on every face of the I-mast. It also

provides a 360 view of the ships surroundings.

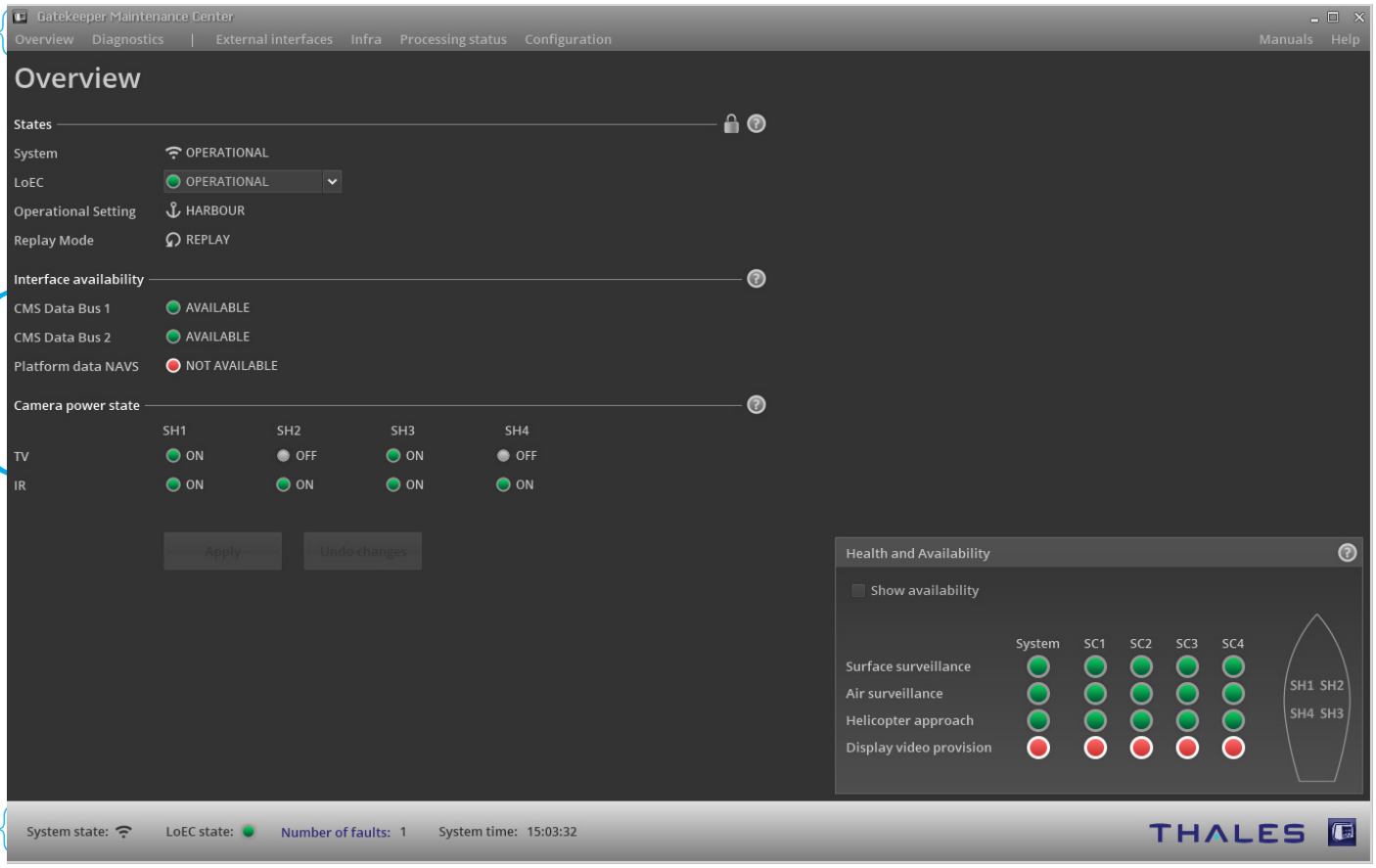
<NR-IFF>

NR-IFF, Non Rotating Identify Friend or Foe, is a communication system. It communicates with surrounding vessels and aircrafts using a interrogator transponder systems. It "interrogates" other vessels about who they are and where they are going. In return, they transpond that same information to other marine vessels or aeroplanes. The NR-IFF is located in the ring just below the sphere on the I-mast.

<SMILE>

The SMILE is a radar surveillance system for detection and tracking of long range(300 m - 250 km) targets. It is located on the I-mast on every face of the I-mast, on the middle deck of the I-mast. The system consists of 4 antennas and 2 processing cabinets.

4 CURRENT MC GATEKEEPER



//Overview screen of the Gatekeeper MC

The current MC is designed for a fixed resolution window. It is scalable in size but not in resolution. The MC design is defined in the guidelines document[6]. The reason for this is to create a general look and feel throughout Thales their product range. A complete analysis of the different screens of the Gatekeeper MC with its functionality and appearance can be found in appendix chapter 9. The Gatekeeper MC is a good example for the general MC look and feel, because it has all essential screens, essential functionality and a few custom screens which are not available in other MC's. The interfaces consist of a Menu Bar{1}, a Status bar{3} and in the middle a content pane{2}. The menu bar lets the user navigate trough the different screens and contains a Help and MC manual button. The content of the Menu Bar is static and will not change during the use of the interface. The content pane displays the information for the selected screen, it dynamically changes with the user input. The Status Bar contains the most important information about the system, it is also a static screen element and will always be present. However, it contains fields which will update due to system or user input. This layout is the same for all the MCs.

<Status bar>

The status bar {1} contains the current system state, the Level of External Control indicator, the system time, the current number of faults and a system connectivity indicator. The Level of External Control(LoEC) reflects which user controls the system. If the maintainer controls the system, he can change certain system parameters or set the system offline so he can do maintenance on the systems. The system connectivity indicator reflects the connection status between the sensor and the MC.

1 Status bar

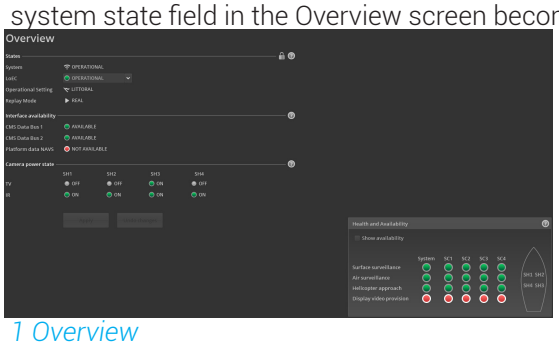
<Menu bar>

The menu bar {1} of the Gatekeeper MC consists of the following: Overview, Diagnostics, External Interfaces, Infra, Processing Status and Configuration tabs. The available tabs will vary between the different MC's.

1 Menu bar

<Overview tab>

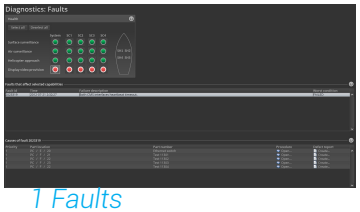
This screen{1} displays the global system function. It is the most important screen for the maintainer. It also lets the maintainer changes the system operating status. The maintainer can do maintenance or unlock buttons and input field throughout in the other screens of the MC. I.e, when the maintainer set the system status to maintainance mode, the system state field in the Overview screen becomes editable.



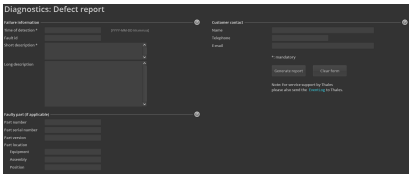
1 Overview

<Diagnostics tab>

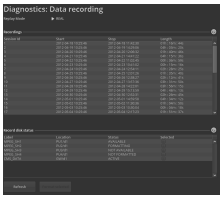
This menu tab has several different sub tabs: Faults {1}, Defect report {2}, Event log {3} and Data recording {4}. The sub menu items are not totally the same for the different MC, but it generally contains information which can help the maintainer to identify and solve a problem. In the defect report screen, the maintainer can document a broken part and how he solved a problem. The Event Log can be generated to supply the Thales Factory personnel which the information required to help the maintainer to solve a problem when the MC supplied information is not enough.



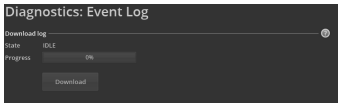
1 Faults



2 Fault report



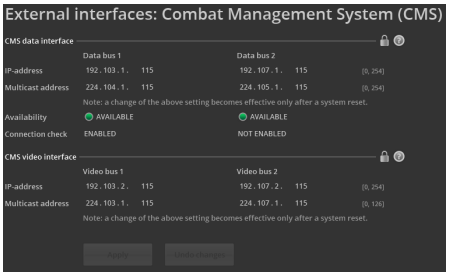
3 Data recording



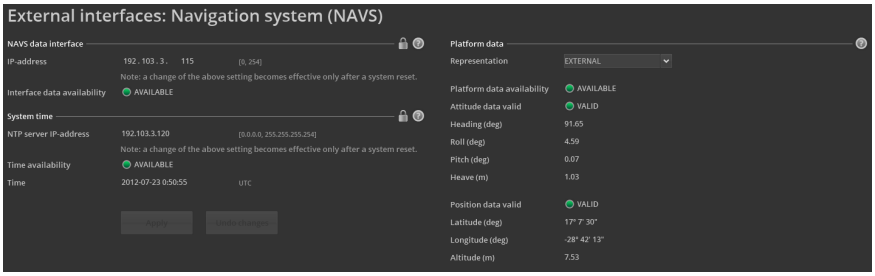
4 Event log

<External Interfaces tab>

This screen contains information about the connection status and location of the different External Interfaces like the Combat Management Interface(CMS) {1} and Navigation System(NAVS) {2}.



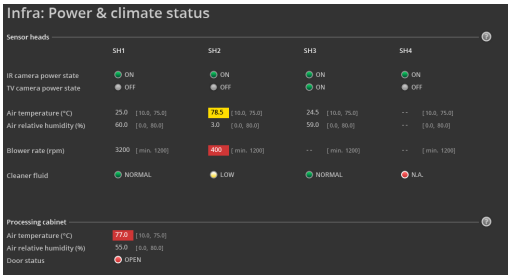
1 CMS



2 NAVS

<Infra tab>

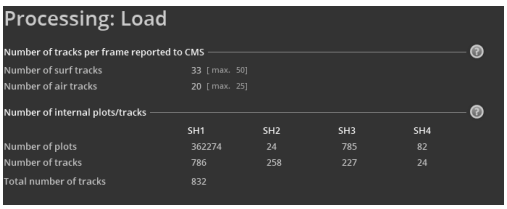
The Infra screen {1} displays information about the infrastructure related components of the system. Here, information about component parameters like temperature, blower and power status can be found.



1 Infra: Power & Climate status

<processing Load tab>

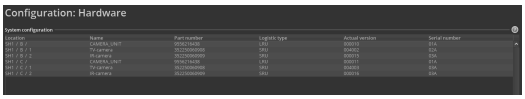
In the Processing Load screen {1}, the maintainer can look up information about the number of sensor data processed and how many is sent to the different external interfaces.



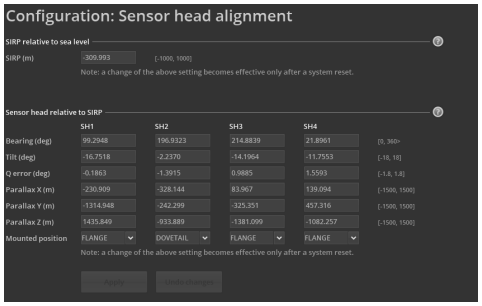
1 Processing: Load

<configuration tab>

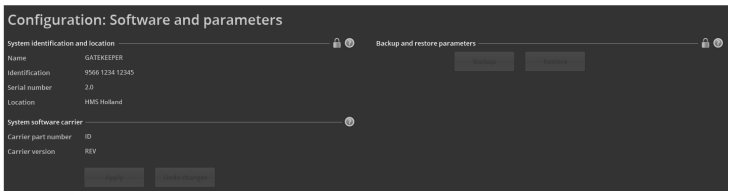
The configuration menu tab contains the following sub tabs: Hardware configuration {1}, Software and restore parameters {2}, Sensor Head alignment {3} and Blind area control {4}. With these sub items, the maintainer can setup the system during the initial information or after a change has been made in the system. In the Hardware configuration screen the maintainer can access information about the different system components which their identifiers like version number and part id. In the Software and restore parameters, the maintainer can change the software version of the system and restore the back-upped important parameters set in the different Configuration screens. The Sensor Head alignment lets the maintainer adjust the alignment of the Sensor Heads in respect to the System Internal Reference Point(SIRP). The Blind area spot configuration is an unique tool of the Gatekeeper MC. It lets the maintainer set up a mask for the different camera images. This mask is used for the reduction of plots and tracks due the masking of unwanted objects like ships antennas.



1 Hardware



3 Sensor head alignment



2 Software and parameters

4 Blind area control

<navigation>

The navigation between these above described screens can be done via the menu bar though a few exceptions exist. There are several hyperlinks embedded in the screens like the hyperlink in the status bar which links the user to the Diagnostics: Faults screen. The total navigation for the Gatekeeper, the I-mast, the NR-IFF, the Seastar and the Smile MC can be found in appendix chapter 2:MC navigation.

There are multiple stakeholders of the MC. Two main groups can be distinguished: Maintainers and Operators. There are several levels of maintainers, each with their different tasks and skills. This following description of the stakeholders has been established with the help of seastar_mc_ui_idd Thales internal scenario document[19].

<Operator>

The operator is not as much involved with de MC, the operator can only influence the state of the system which influences the MC. The Operator operates the Combat Management System. His goal is the completion of the current given mission. His/her task is to identify possible threats and needs all the capabilities of the system to be online and running. The operator communicates with the maintainer about how long it is going to take to repair the system and if the maintenance can be performed. The Operator is located in the command centre of the ship.

<Operational level maintainer>

This is the real user of the MC. His goal is to maintain/repair the systems during a mission and to keep all the systems available. The OLM is also located in the command centre on the ship, near the system on the ship, travelling to the system/command centre, or on its way to get spare parts/travel to system. He communicates with the Operator and with the Supplier through phone or face-to-face communication. On a ship, a total of 1-3 OLM can be operating the system. They each have their own MC. They also communicate with each other through phone or face to face communication about who is going to do which reparation/maintenance. The OLM has the MC on a Windows OS running desktop in the system command centre, or a laptop near the system. When he needs a spare part, he communicate with the supplier about the availability. The main tasks of the OLM are: Prepare/check systems for operational use, corrective maintenance and preventive maintenance. For these tasks he needs the MC, tools, spare parts, and a manual to repair the system. During these task, the maintainer need information from the Operator, Supplier and the Factory Personnel. From the Operator he needs information about the clearance to do maintenance. He needs to know if the systems he wants to do maintenance on are critical for the completion of the current mission. He alerts the Operator about system failure or when he is going to do maintenance and how long it is going to take. He informs the Supplier about which parts are needed and which parts are broken, so they can be reordered. He also generates fault reports and event logs which are needed by the factory personnel to validate the system performance and generate solutions if the OLM cannot solve them on spot.

<Supplier>

The person who is in charge of the spare parts supply for the maintainer. He does not use the MC. His goal is to inform the maintainer about the availability of the spare parts and supply these to the maintainer. The supplier also orders spare parts if the stock is empty or running low. He is located near the supply depot on the ship. He communicates with the OLM through phone or face-to-face communication. His main task are: Inform the maintainer about part availability, Supply parts and order parts.

<Intermediate level maintainer>

This maintainer is more experienced and skilled than the OLM. His global tasks are the same, but the way he executes them are not. The ILM maintains the system when the ships is off mission and anchored in the harbour. During the maintenance he is near the system or near the central storage room.

<Factory personnel>

These are the expert users of the MC. Their main task is to validate and test the systems performance. Their role combines the roles of the Operator, OLM and the ILM. They are located in the factory or, if the above users/stakeholders can't solve the problem, on the ship near the system. Their main tasks is to install and test the system. They also provide a solution when the OLM is unable to solve them on the ship.

IVV	Factory Personnel
Operator	Operator of system, CMS
MC	Maintenance Center
System	Complete system with sensors, processing cabinets, data storage
OLM	Operational Level Maintainer, maintainer during mission/system operation
Supplier	Supplier of the spare parts wich are needed by OLM

DURING MISSION DATA FLOW

Maintenace:
All the maintenace that is required to make the system operational. Corrective and Preventive maintenance

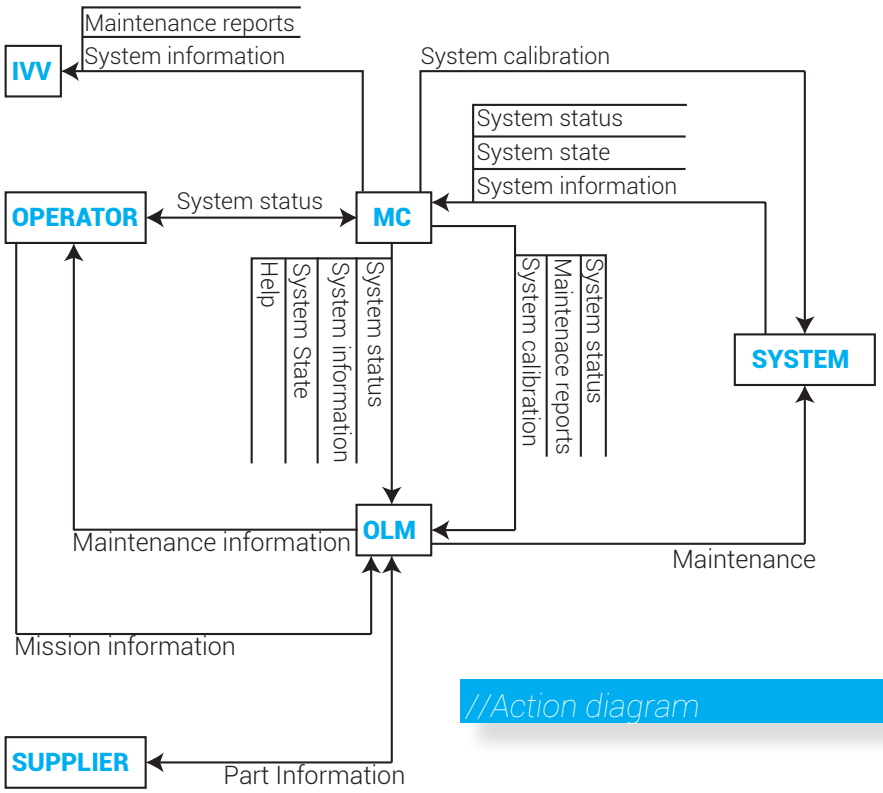
Maintenace reports:
All the reported information from the maintainer, like fault reports and event logs.

Help:
All the available help to support the maintainer with his work and use of the MC.

Parts information:
All the information about replaced/broken parts and stock of those parts.

System calibration:
All the calibration wich is required to make the system operational. Includes data like sensorhead alignment and external interface ip adresses.

System information:
All data about Hardware and software related topics which the OLM cant influence. Is needed for maintenance



//Action diagram

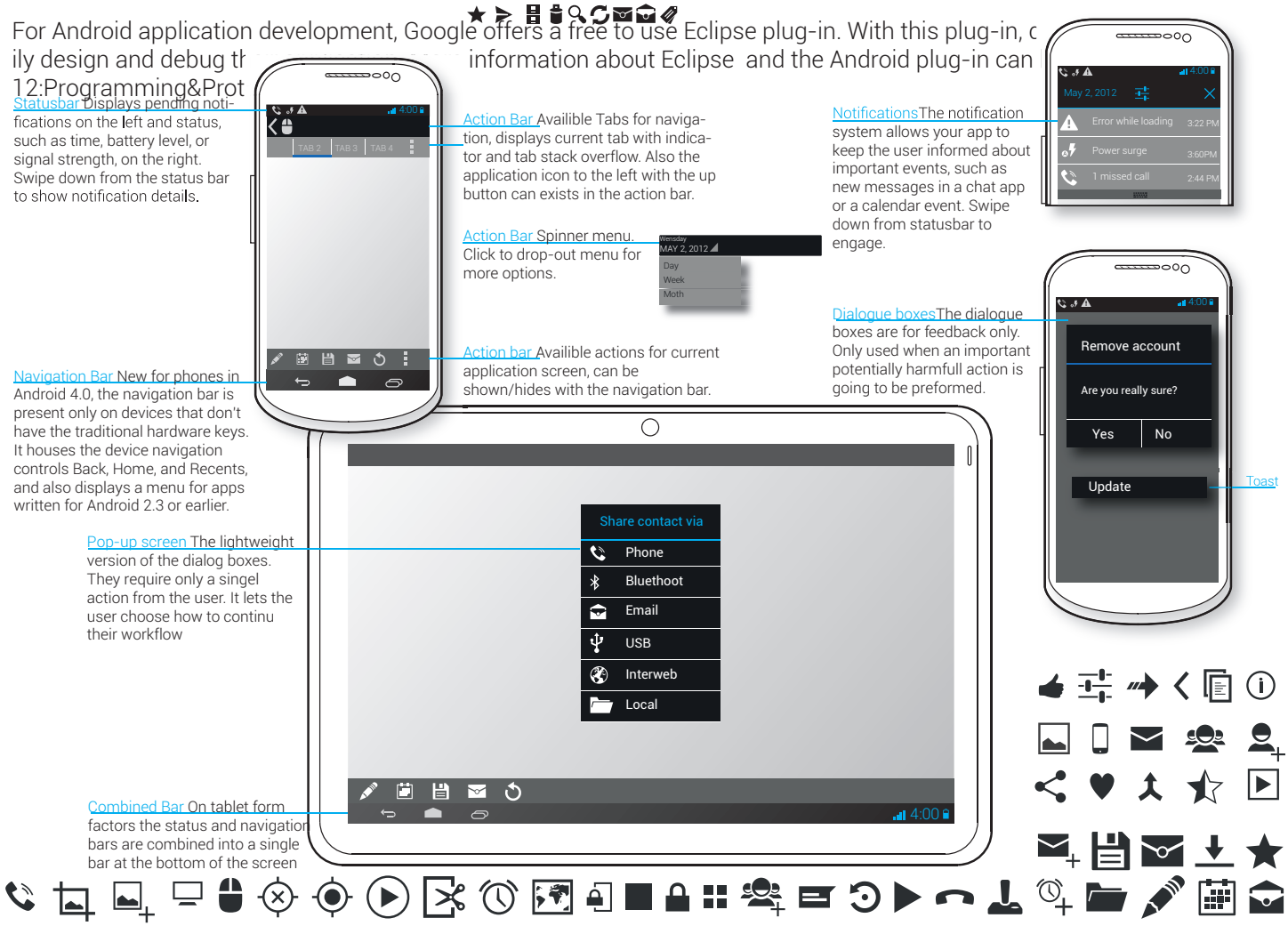
From this diagram can be derived that the most important MC user during a mission is the OLM. The mobile MC is used to identifying, finding and solving problems. The total time needed for this process is most vital during a live mission therefore the OLM shall be the main user of the mobile MC. The OLM user shall be taken focused when designing the prototype and for the establishment of the new guidelines.

Android is an open source OS(Operating System) for mobile devices. Open source means that the source code is accessible for everyone and free to use. This results in a wide range of Android OS running devices. Especially low end tablets and smartphones use the OS. Android is based on the Linux kernel and is programmed in the java programming language First developed by the company Android inc., Google took over the company in 2006 and evolved Android to its current state[23]. Due Android being open source, an enormous increase can be seen of devices running Android over the past 2-3 years[11]. Because Android runs on such a broad range of devices, Android is specialised in supporting a large variation of screen sizes and resolution. A major part of Android their interface guidelines consists of subjects about supporting different screens. Android has a slightly varying guidelines for the different Android OS versions. For convenience and time purposes, the targeted Android OS version of this assignment is the latest Android OS 4.0: Ice cream sandwich. For latest version of the Android guidelines see the Android website[11].

Android 4.0 features a clean and simple interface look. Below this section, an overview can be found of the main interface elements. An typical Android application features an Action bar, status bar, content pane and a system navigation bar. In the action bar, the available actions are displayed for the current selected content pane. Generally those actions are accessible with a icon or text field inside the action bar. On the Android website[11], a wide range of standardised icons can be found though developers can design their own icons with the help of the Android guidelines. The action bar can also be used as an application navigation bar. The content pane displays information or provides the application functionality for the currently selected view. The status bar displays the status of the device itself, like battery status, notification and wi-fi strength. The system navigation bar is used to navigate between the platform active applications, go directly to the home screen or go back to a previous selected screen. The system navigation bar is a replacement of the physical buttons found the older smartphones/tablets. For tablets, de status bar and the system navigation bar have been merged.

For the GUI input elements like buttons and checkboxes, Android has existing Widgets with a standardised styling. A overview of these input elements can be found in chapter 4:Android of the appendix. The widgets can be restyled according to the developers requirements. I.e the different properties of a button, like size, color, pressed state and drop shadow can be adjusted.

For Android application development, Google offers a free to use Eclipse plug-in. With this plug-in, c
ily design and debug th information about Eclipse and the Android plug-in can
12:Programming&Prot



The current MC guidelines have been established with the help off the following documents:

1	MIL-STD-1472FDoD	Design Criteria Standard – Human Engineering
2	IEC 60417-1	International standard – Graphical symbols for use on equipment – Part 1: overview and application
3	ASD STE100	Simplified Technical English
4	ISBN 92-822-2213-6	The International System Of Units (SI)
5	IEEE 1541-2002	Units of measurements for digital electronics and computing

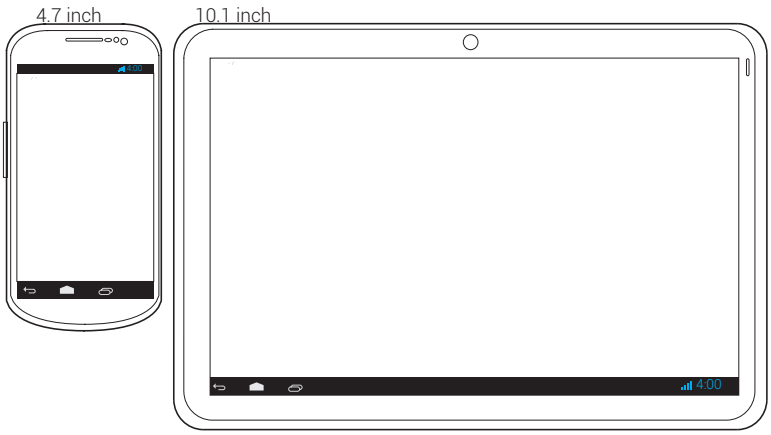
Thales hired a graphical designer for the GUI design of the desktop MC. Bases on this design, the current guidelines have been established. The current MC guidelines contains information about the MC, about its users, usage environment, graphics elements, colours, font family, screen lay-out, the functional hardware and interface connections. For transformation of these guidelines to a mobile MC guidelines document, an addition/alteration has to be made in respect to the original guidelines. The look and feel of the mobile MC shall be in respect to the desktop MC. It is important that the user experiences the two different MC's as one product, because the mobile MC is a addition to the desktop MC which is later explained in chapter 9:Use case.

For the formulation of the new flexible display and multiple devices guidelines, the current guidelines[6,7], several OS specific guidelines, general interface design guidelines[8,9,10] and general GUI design guidelines[11,12,13,14,15] for mobile devices have been researched. The mobile GUI guidelines document is a external document and can be obtained by contacting the University of Twente. These new guidelines give an overview with graphical illustration concept about how the interface could look if the new guidelines are implemented. This concept is elaborated in a prototype. This prototype is described in chapter 12:Programming& Prototype.

<Adapted>
The use of color and general lay-out have been adapted to ensure the same look and feel between the current MC and the mobile version. The desktop MC tab structure is adapted and the navigation between the tabs. The core status/ health icons and progress indicators are adapted to ensure consistency between the two platforms. The information displayed per screen, as described in appendix chapter 9:Desktop MC Analysis, is roughly the same for the two platforms.

<Addition>
There are several additions to the current guidelines. A chapter about Android has been added. In this chapter, information can be found about Android 4.0 and how its look and feel can be merged with the current desktop MC look and feel. Also a quick overview has been given about how the Android OS based MC can be designed to work with a broad range of different screen sizes.

<Alteration>
An alteration of the current guidelines have been made for the following elements: Navigation, GUI elements, platform requirements and the main role of the MC.



//Smartphone&Tablet size

For a fair analysis of the currently available smartphones and tablets, the most recent models have been used. Smartphones: IPhone, Samsung Galaxy SIII, Samsung Galaxy Nexus, HTC One X and the Nokia Lumia. Tablets: Asus Transformer Prime, Samsung Galaxy tab 2 10.1, Aple Ipad2, Lenovo K2010 and the Samsung Galaxy tab 1 10.1. The results can be found in appendix chapter 11:Smartphones&Tablets analysis.

<Size>
Smartphones and tablets differ in size. The size of a smartphone ranges between 3.5-4.8 inches. The tablets size ranges between 7-10.1 inch. But the two platforms don't significantly differ in pixels. This results in a difference in mobility and the amount of information which can be displayed.

<Weight>
Due the increased size and the increased battery pack, Tablets weigh more than smartphones. Smartphones generally weigh around 140 gram. Tablets weigh triple of four times that value.

<Camera>
Cameras on the two platforms are generally the same and average around 8 mega pixel. Also the video recording quality is generally 1080p.

<Sensors>
Smartphones have more sensors. Tablets have an accelerometer, gyro and a compass. Smartphones also have these sensors. In addition they some have a barometer, proximity sensor or even a RGB sensor.

<Processor & RAM>
Processors and RAM memory differ significantly over both platform. They range from 1 Ghz single core till 1,7 Ghz quad core. No clear correlation for platform and processor speed/RAM can be found.

<Battery life>
The battery life for the smartphones is much greater than tablets. Due the increased screen size and the less efficient hardware used in tablets, it consumes more energy. Though tablet have a bigger battery pack, the don't last longer. Only the Asus transformer has a longer battery life in comparison to the smartphones. The reason for this is that the Asus Transformer has a docking station, which can be completely separated from the tablet itself, with a keyboard and an extra battery back.

<Memory Storage>
The Tablets have a greater storage capacity than smartphones. Also they can provide an extra SD slot to double or triple their storage capacity.

<Conclusion>
A smartphone is a pocket-sized combination of a PC and a phone. It lets the user interact with the device through a touchscreen and/or physical buttons. It is mostly used for a constant connection to a virtual environment. Where its users can communicate with each other, share content, search information, stream audio/video and play games. To support these functions, a smartphone generally has a touchscreen, camera, some sort of physical buttons, audio input/output, internal memory wi-fi adapter, gps, accelerometer, gryro sensor, bluetooth, mobile network access, sim card reader and some sort of OS with a whole scale of applications. A tablet is basically the same device, only big-

ger. This size difference results in a bigger screen resolution, heavier weight, lesser mobility, shorter battery life and a bigger memory storage. Though a tablet has more space available for a battery in its shell, it doesn't have a greater battery live. For the discussion on which platform to chose, the only thing important is the preferred size of the device. The other differences are marginal. The size difference also results in a usability difference. The Tablet is to unwieldy to hold with one hand and it is never going to fit into a pocket. On tablets twice of three times more information can be displayed in comparison with a tablet provided that they have the same pixel density. An example can be found of this comparison the previous page.

9 USE CASE

The mobile MC is an addition to the desktop MC. It has to function whereas the desktop MC can not. The desktop MC is not portable and thus can not be used on route to the system. The desktop MC could be run on a laptop, but the environment conditions on the route to the system prevent the laptop to be used while traveling. This environment is highly varying in term of available workspace, temperature, humidity and balance. There also are steep ladders which can not be overcome without using both hands. It is impractical to use the laptop running the desktop MC on the system location due the same environmental reasons. The mobile MC could be a much better substitution. Thus the available information and functionality the mobile MC offers, should be enough to support the maintainer on the route to the system and at the systems location.

Before the mobile MC concepts can be designed, the use case for the mobile MC has to be defined. The target interface functionality and the interface provided information have to be set. For this purpose, an action diagram has been made to explore the possible actions the user could execute with the MC. With the overview of the required actions, a final concept has been made which is going to function as a framework for the prototype application.

The action diagram, which can be found in appendix chapter 12:Action diagram, has been mainly constructed with the meetings described in Chapter 2:Process and the concept generation which can be found in chapter 11. The diagram input is an already identified fault by the OLM with the desktop MC. The maintainer has the information about which fault affects which system and what can be the cause of that fault. The maintainers discusses with the operator which fault he is going to solve. For this discussion, the maintainer has to provide the operator with a indication of how long the procedure is going to take and what are the required conditions for solving the fault. When the operator gives the maintainer permission, he is going to check the system at the system location. He can navigate to the fault with the mobile MC. The mobile MC gives the maintainer an exact fault cause location and extra information for fault conformation(like the infra/processing screen).When the maintainer arrives at the fault location, he can chose to undertake several actions. He can confirm the fault by looking at the infra/processing status screens, contact another maintainers or when the fault is confirmed, he can commence the replacement procedure. For this replacement procedure, there are several required conditions to be met before the maintainer can begin with the replacement procedure. These requirements are: Required system state, required spares, required skill level, required time. Therefore the mobile MC should have the option to change the system to the required state with the mobile MC. The maintainer makes the error report with the desktop MC. The maintainer does not set the system parameters, like sensor head alignment, at the system location with the mobile MC, because this is a system set-up/install action. This is a action the maintainer does not have to perform very often, so it is absent in the mobile MC to reduce the interface function pollution. Only the most essential functions should be present in the interface as described in the mobile MC guidelines. The mobile MC is, like stated before, a addition to the desktop MC.

The mobile MC should support the maintainer during the fault location navigation, fault confirmation and fault replacement procedure. Other options, like making an photo to share this with other maintainers or a communication/scheduling interface could be included in the interface, but further research is required to identify the requirements for these new features. This research is outside the scope of this bachelor assignment document.

<Desktop>
The desktop MC role has been described in chapter 4:Current Gatekeeper MC of this document. The desktop version of the Gatekeeper MC provides support to the other two platforms: Tablet and smartphones as described in the previous chapter. The maintainer operates the desktop MC in the central control room of the ship. The desktop MC provides the maintainer with initial information required to start the maintainance process. This initial information is available on the other two platforms as well. The maintainer uses the mobile platform MC for on the spot information and functionality as described in previous chapter. The desktop MC is used for more specific tasks which don't have to be performed often or which require a keyboard or connection to the systems database. Thus the desktop MC is used for the configuration of the system(like sensor head alignment) and logging(making fault reports, eventlog, data recording). Essentially, the desktop has all the screens that where abolished after phase one of the concept design(Chapter 11) in addition to the screens available on the smartphone and tablet.

<Tablet>
The tablet mobile MC features the most information and functionality of the two mobile platforms because of it's screen size. The tablet mobile MC should support the maintainer in identifying, locating, confirming and solving a arising fault as described in the previous chapter. For the Gatekeeper MC this results in the following screens: Overview screen to identify the fault. Faults screen to identify the cause of the fault. The navigation screen(see chapter 11) to locate the fault. The processing, infra and software&parameters screen to confirm the given cause of the fault. And finally, a replacement manual for the replacement procedure.

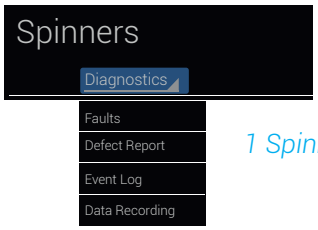
As described in the previous chapter, the tablet is less easy to handle with one hand in comparison to the smartphone. This problem can be worked around by providing a wall suspension unit to hold the tablet or make a belt/clip which can be attached to the arm or torso of the maintainer. This is however not ideal because new product is required to fix the usage problems of a other, which means another potential for failure or usage problems.

<Smartphone>
The smartphone is significantly more mobile in comparison with tablet but the screen size results in a reduction in the information which can be displayed as described in chapter 8. Though it can contain the same amount of information and functionality in comparison to the tablet, it is always less accessible when the same interface is used on the smaller screen. Thus the smartphone mobile MC should only feature the most vital information for identifying a given fault. This results in the following screens: The overview screen to identify the fault and the faults screen to identify the cause of that fault.

The smartphone is a lot of easier to handle, and can be used to communicate to other maintainers. Due its size, its needed working space is much smaller than the tablet and it can be i.e used to take pictures or video in small spaces.

<Conclusion>
The three platforms: desktop, smartphone and tablet should supplement each other to provide the maintainer with the best support possible. They each have a characteristic implementation field. The size difference between the smartphone and the tablet results in two major MC usability differences. Smaller means less information can be displayed on the screen. But smaller also means a higher mobility of the device. Therefore the smartphone should only contain the most vital information and functionality of the MC. The tablet should display the information and have the functionality that cant not be displayed on the smartphone due usability reasons. An good example is the part replacement manual. The manual is not designed to be readable on a smartphone screen size. The tablet screen size is better suitable for this. Finally, the desktop should run the complete MC. The mobile MC could also contain a feature which makes communicating between user easier. This option has not been elaborated and thus not included in this document.

Based on the system, use case and new guidelines several concepts have been made. There are three main phases visible in the concept generation. Each phase is a further refined design of the previous phase. The concepts are used to get a better understanding of the problems faced when redesigning the interface for a flexible screen resolution and size. The three concept phases complement each other. The final concept is the foundation for the prototype and the new mobile guidelines.
The first phase is a full port of the desktop MC for a smartphone to get a feeling about how much information/functionality can be preserved from the desktop interface. It show a basic concept of the screen layout and present interface elements. The different screens can be found in appendix chapter 5:Concept 1. The main navigation is done trough a swipe gesture to navigate between the tabs. The tab overflow is managed with a spinner tab{1}, i.e. grouping screen sections like the faults: Fault reports, Faults, Data recording and eventlog into one spinner tab.

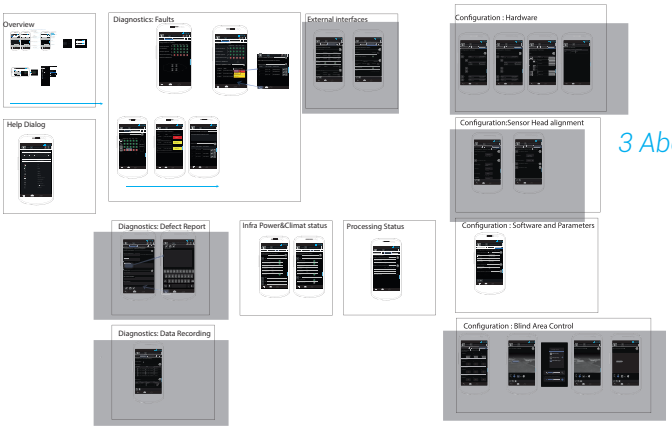


1 Spinners

Due to the limited screen size, the capabilities health&status widget text has been replaced with icons {2}. This icon transformation of the text has been dropped in a later stage because of recognizability problems.

2 Icons instead of text

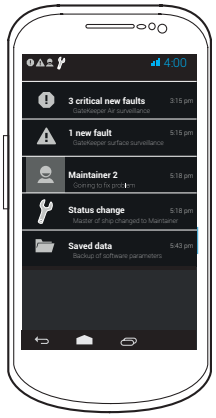
Due usability reasons and the fact that the screens are not vital for the mobile MC(see chapter 8: Use case), the Diagnostics: Defect Report, Diagnostics: Data recording, External Interfaces, Configuration: Hardware, Configuration: Sensor Head Alignment and Configuration: Blind Area Control screens where abolished {3} after this first phase.



3 Abolished screens

The second phase focuses on the differences between smartphone and tablets and their screen orientation. Here the navigation screen is first described {4}. The navigation screen lets the maintainer navigate to location of the fault cause and select and desired action, i.e. open replacement manual and generate fault report(*pp 56,57*). Also the history screen {5} has been designed(*pp 57*). The maintainer can send the important system status updates and actions to the notification area of the Android platform. This can be used for documentation of past actions and notification of occurring faults.

4 Navigation screen

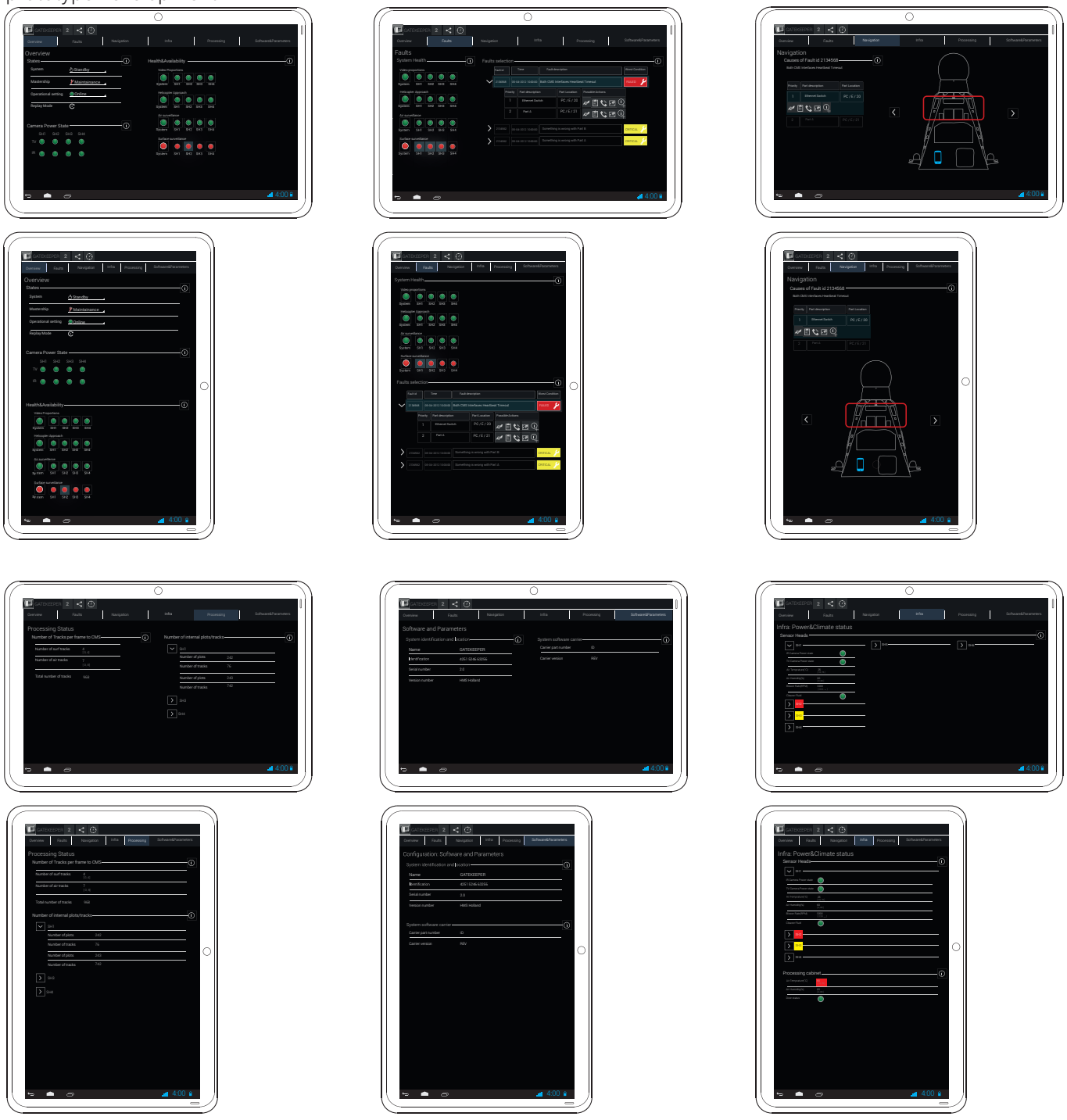


5 History screen

Finally an extra screen {6} to display the requirements of a replacement procedure has been designed(*pp. 57*). A requirement can be a required skill level, tool set, replacement procedure time, affected system capabilities or spare part.

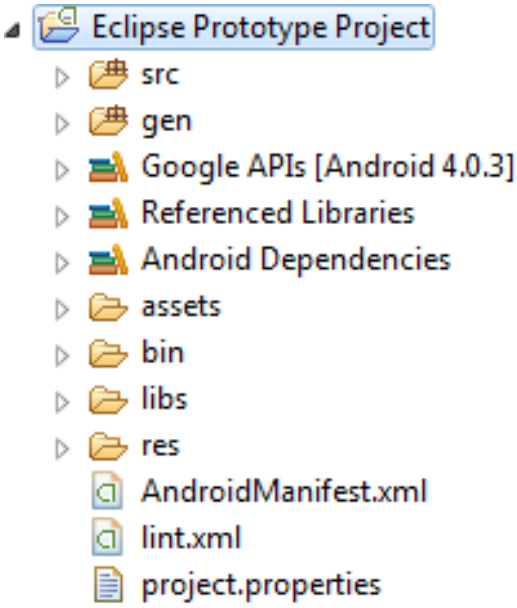
6 Requirements screen

The third concept phase is the final phase in the concept generation. In this phase the final look of the interface and the available screens has been determined. Only the Tablet based MC is taken into account for time resource reasons. In the third concept phase, various screen compositions have been designed(see appendix chapter 7) and resulted in the final concept(see appendix chapter 8) {7}. This final tablet concept is used in the Guidelines document and for the prototype development.



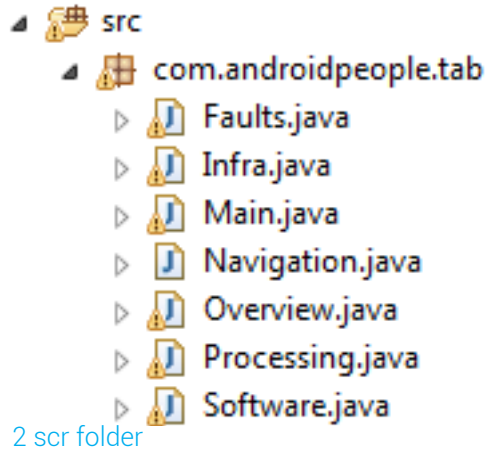
7 Final concept

To develop the MC prototype, an application has to be made which can run on a Android OS running device. For the development of the prototype, the program Eclipse has been used in combination with the SDK plug-in provided by Google. The libraries are provided by the Google plug-in. With the plug-in, the application can be tested using a emulator or a real device. The prototype is a mock-up version of the application with lets the user experience the application navigation and input possibilities. The code used can be found on a external medium, which can be acquired by contacting the University of Twente. The code of which the application consists is distributed across several files in several folders in the Eclipse project{1}.



1 Eclipse project folder structure

The main code files are: The manifest file, lay-out.xml file, several activities.java files. All the activity.java files are located in the scr folder of the Eclipse project folder structure{2}.



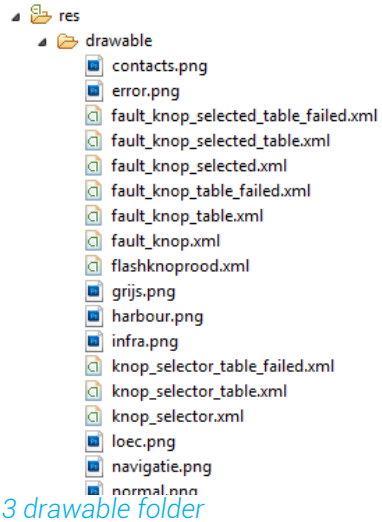
2 scr folder

The activity.java files defines the functionality of the components defined in the layout files. For each screen, a different activity.java file has been created. The main activity.java file is started when the application is first launched and initializes main functionality of the application(like the navigation). These activity.java files have to be defined in the Manifest.xml file. This manifest.xml file lets the android device know, what kind of application it is, what Android OS version it uses, which permissions are needed(like internet access), which theme to use and which activity file is the Main activity file.

The main activity file is the most important file of the Eclipse project of the prototype in term of functionality. It initializes the default screen of the application and contains the code needed for the in application navigation. The main navigation of the prototype is done trough a TabWidget. In this Tabwidget tabs can be added. Each tab corresponds to a specific activity.java file. When a tab is selected, the application loads the corresponding activity.java file. In this activity.java file initializes a new layout.xml file, a MC screen and corresponding functionality of that screen.
The Tabwidget is also linked to a GestureDetector widget. This GestureDector widget recognizes the user touchscreen input. The swipe gesture(see Mobile MC guidelines pp 16) is linked to a tab switch depending on the swipe direction. Thus the user can navigate trough the interface by clicking the various tabs or making a swipe gesture. Documentation

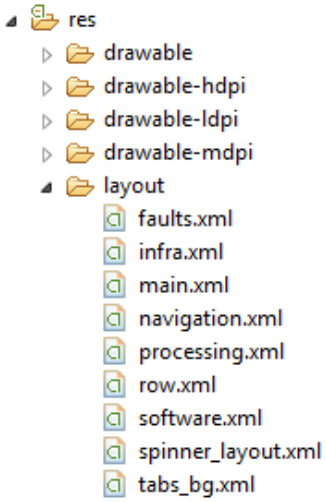
about these widgets can be found on the Android developers website[11].

The application needs resource files. These resource files are located in de res folder of the Eclipse project. In the res folder{3}, several sub-folder reside: drawable, lay-out and values. In the drawable folder, contains all the images and other drawables for the project.



3 drawable folder

Inside the lay-out folder of the res directory, all the lay-out files for the different screens are located. Every screen uses at least one lay-out file. Inside the file, the lay-out of the used widgets are defined, the size of those widgets, colors, background, text type and etc. Android provided the developer with standard widgets which can be customized. An overview of those standard widgets can be found on pp 20 of the Mobile Guidelines which can be found in appendix chapter 15:Mobile MC guidelines.



4 Layout folder

A standard button widget can be adjusted to have a different background color as in the following code snippet defined in a layout.xml file:

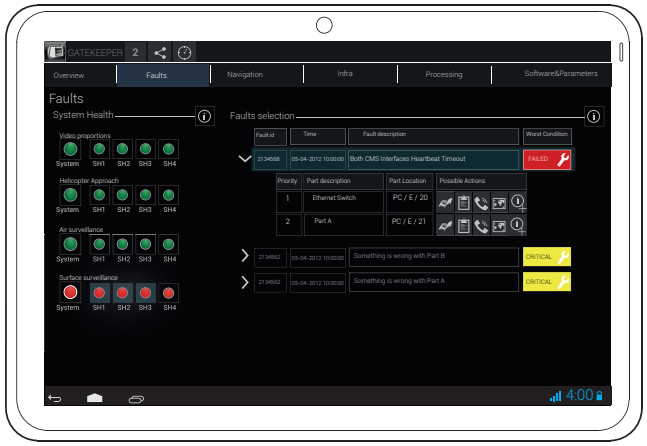
```
<Button                                          \\widget name
android:id="@+id/navigate"                       \\adds an id to that widget, which can be called in the .java file
android:background="@drawable/black"             \\sets the background to a color value located in the drawable
                                                   directory named "black"
/>
```

This is how the buttons functionality is declared in the activity.java file:

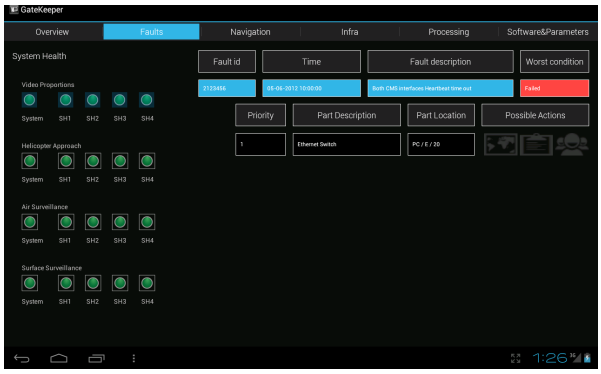
```
Button navigate = (Button) findViewById(R.id.navigate);          \\Find the button by its id given in de layout.xml file

        navigate.setOnClickListener(new OnClickListener() {      \\Add a listener to the button which method is
                                                                   executed when the button is pressed

.....                                                            \\Executable code
                                }};                              \\End of method
```

This example show how a layout.xml file is coupled with a activity.java file.

The prototype design differs from the final concept. Not everything could be programmed in such a way it exactly resembled the final concept. Concessions had to be made due time and knowledge reasons as can been seen below{5,6}. The insight gained trough the development of the prototype helped with the establishment of the mobile MC Guidelines.

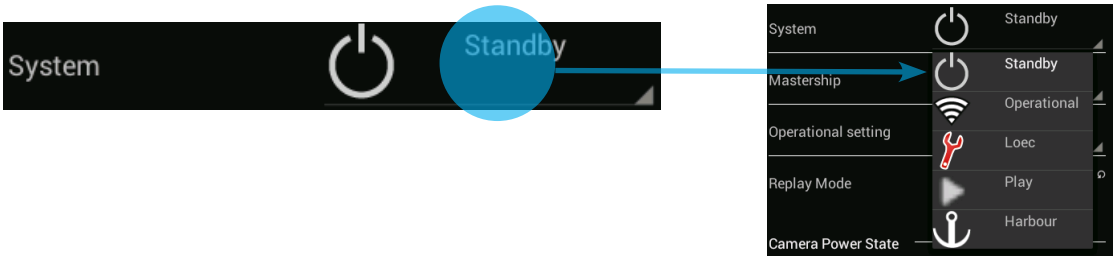


5 Concept MC Fault screen

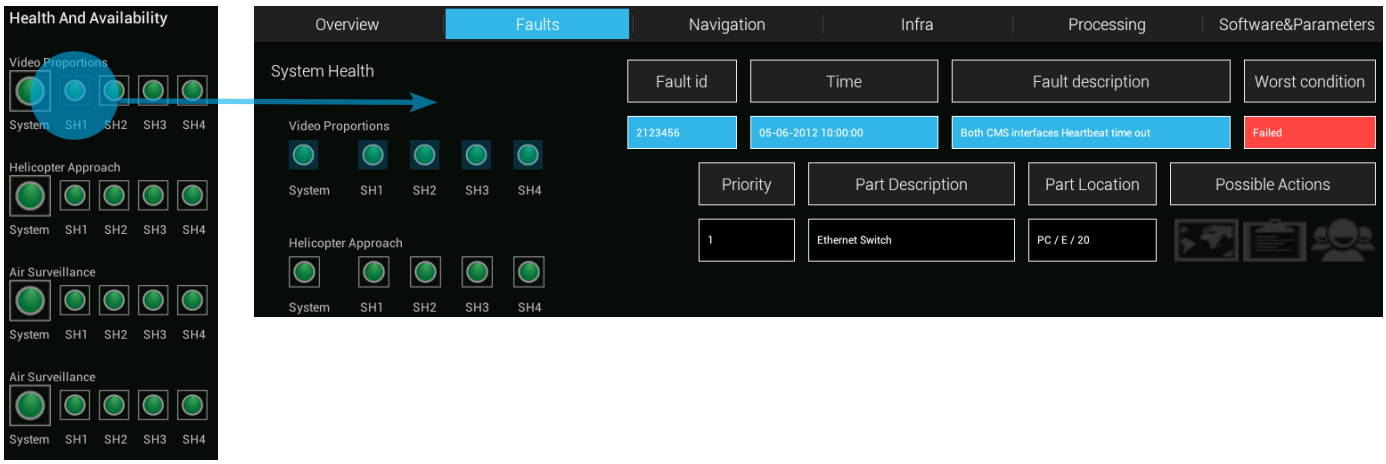


6 Prototype MC Fault screen

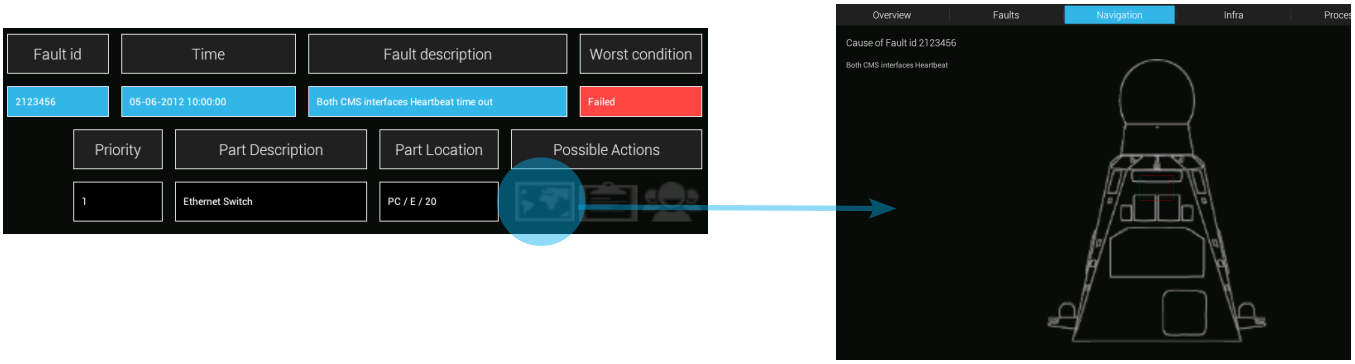
The prototype MC has the basic navigation needed to navigate trough the MC. The Overview, fault and navigation screens have been coded. The Overview screen has a working spinner and health&availability screen.



The health&availability screen can be used to navigate to the fault screen like the current Gatekeeper MC described in chapter 4.



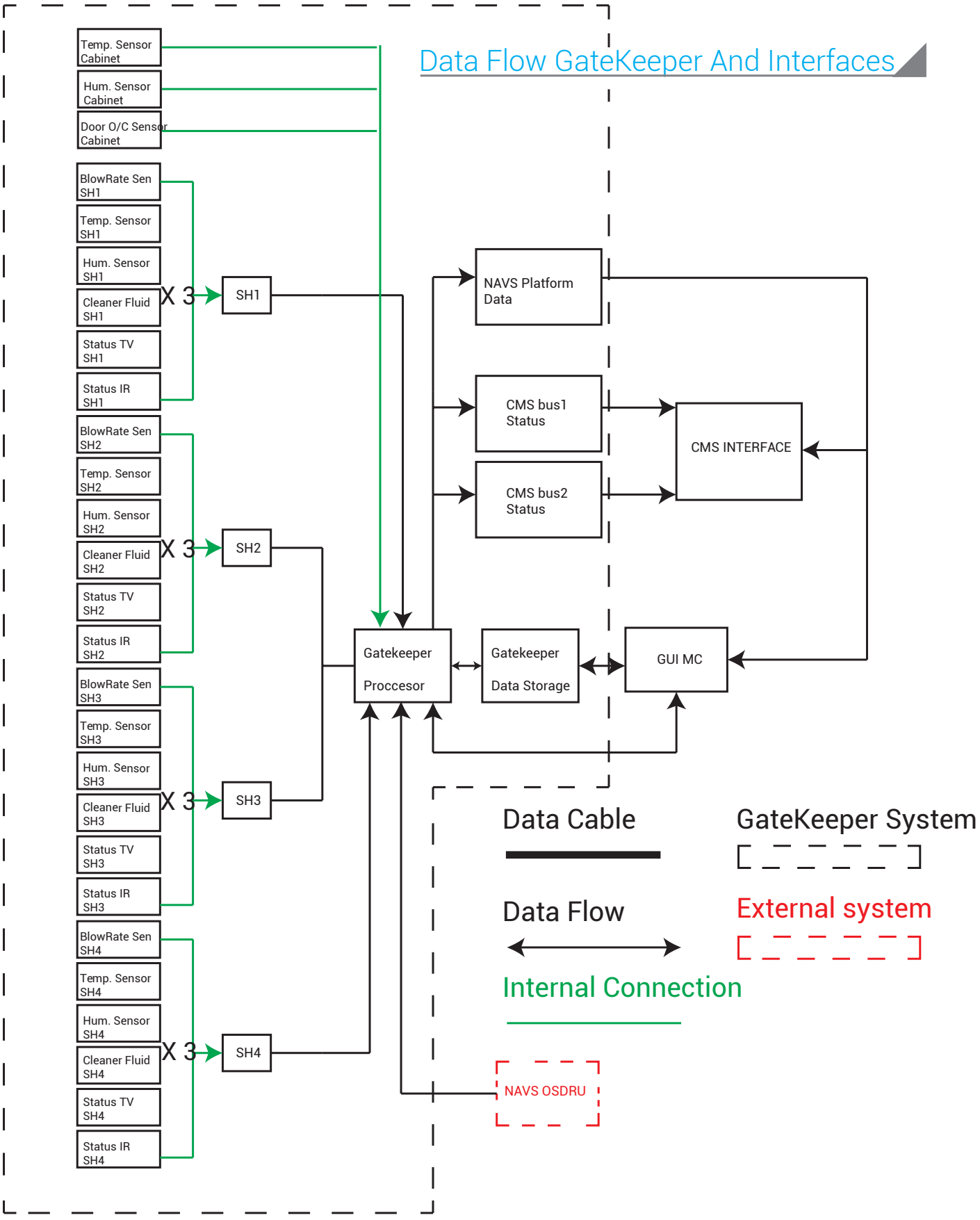
In the Fault screen of the prototype MC, the user can click the navigation button present in the cause of fault possible action section. When this button is pressed, the interface switches to the navigation screen with the cause of fault selected.

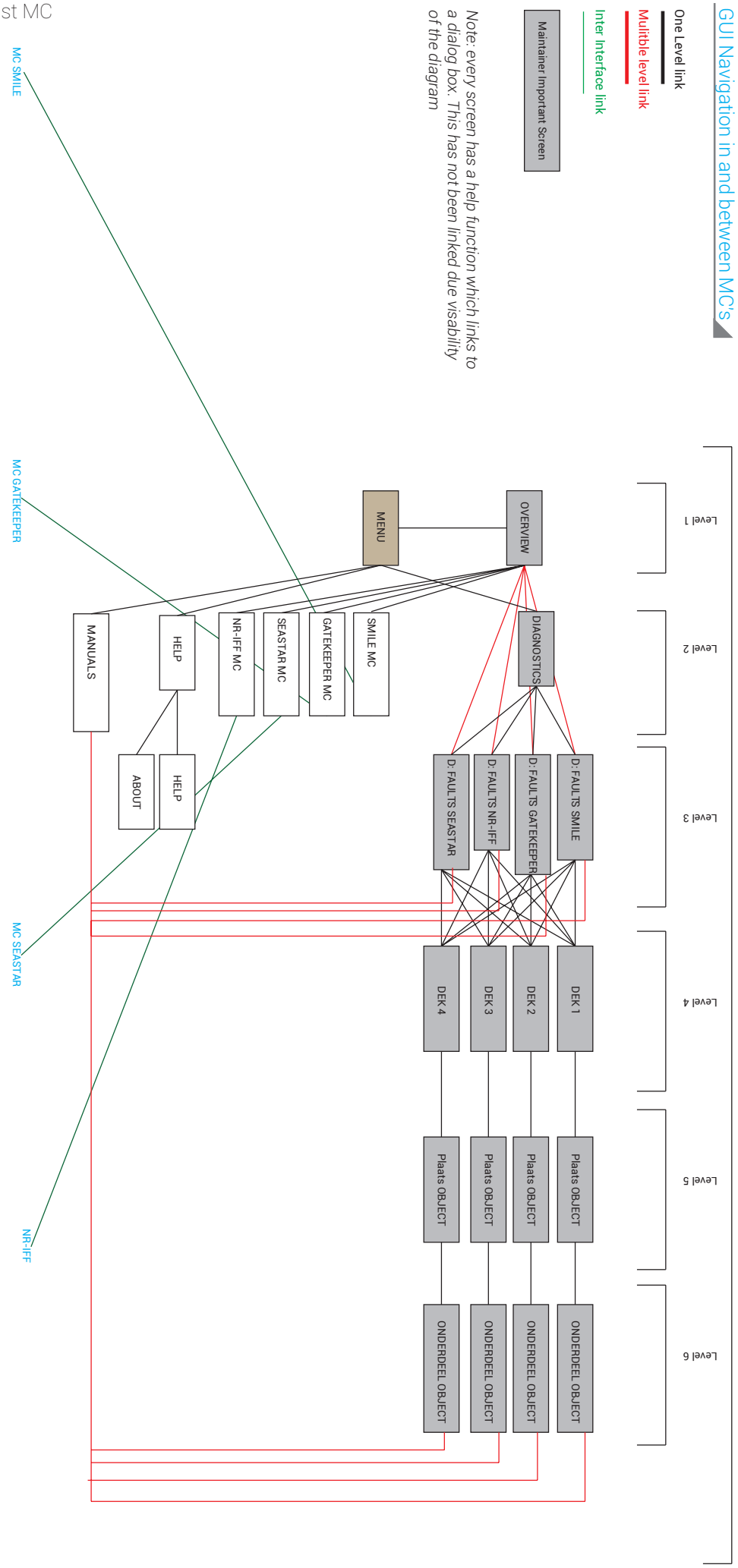


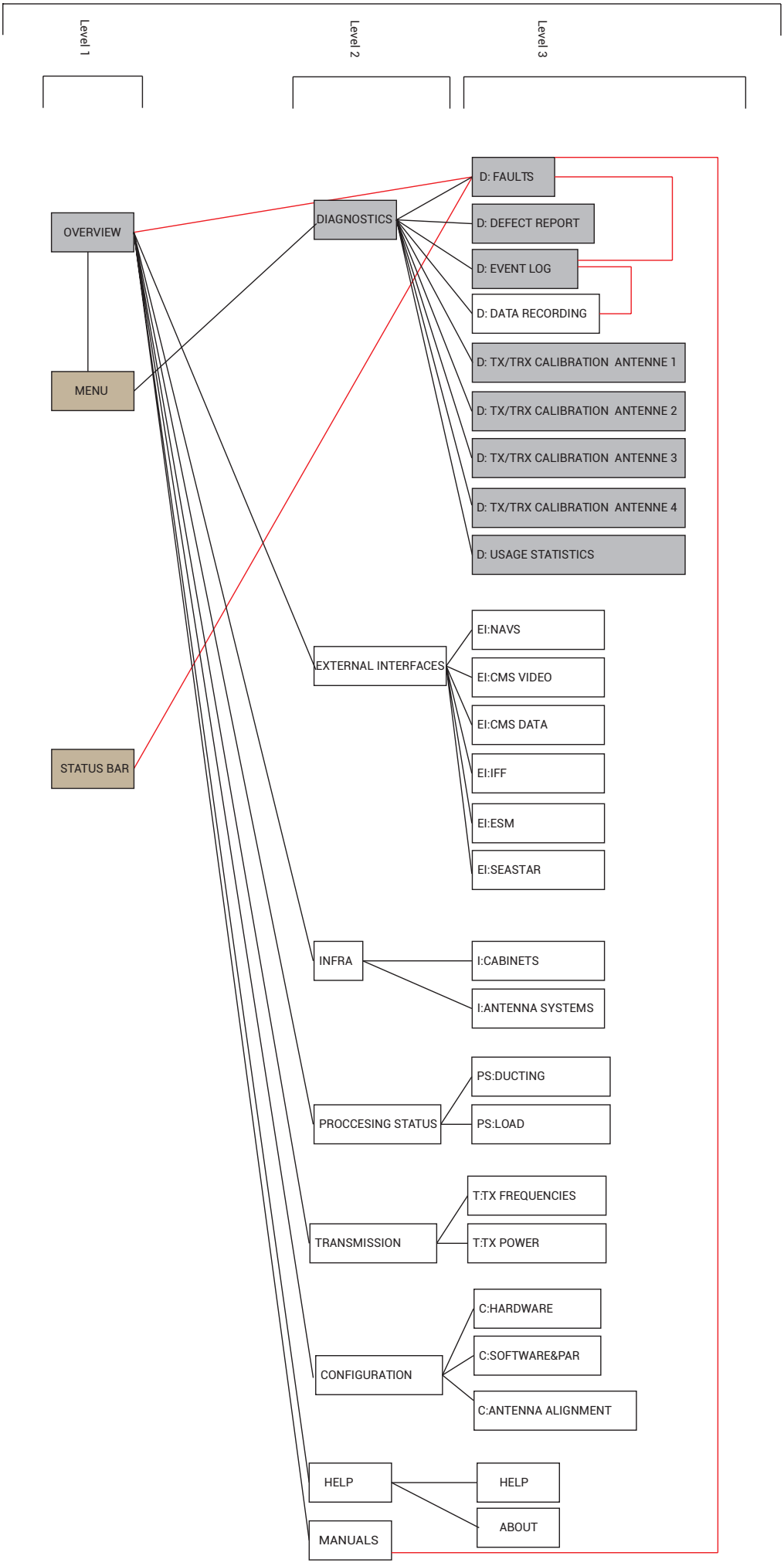
The other prototype screens don't have any interaction possibilities except tab navigation.

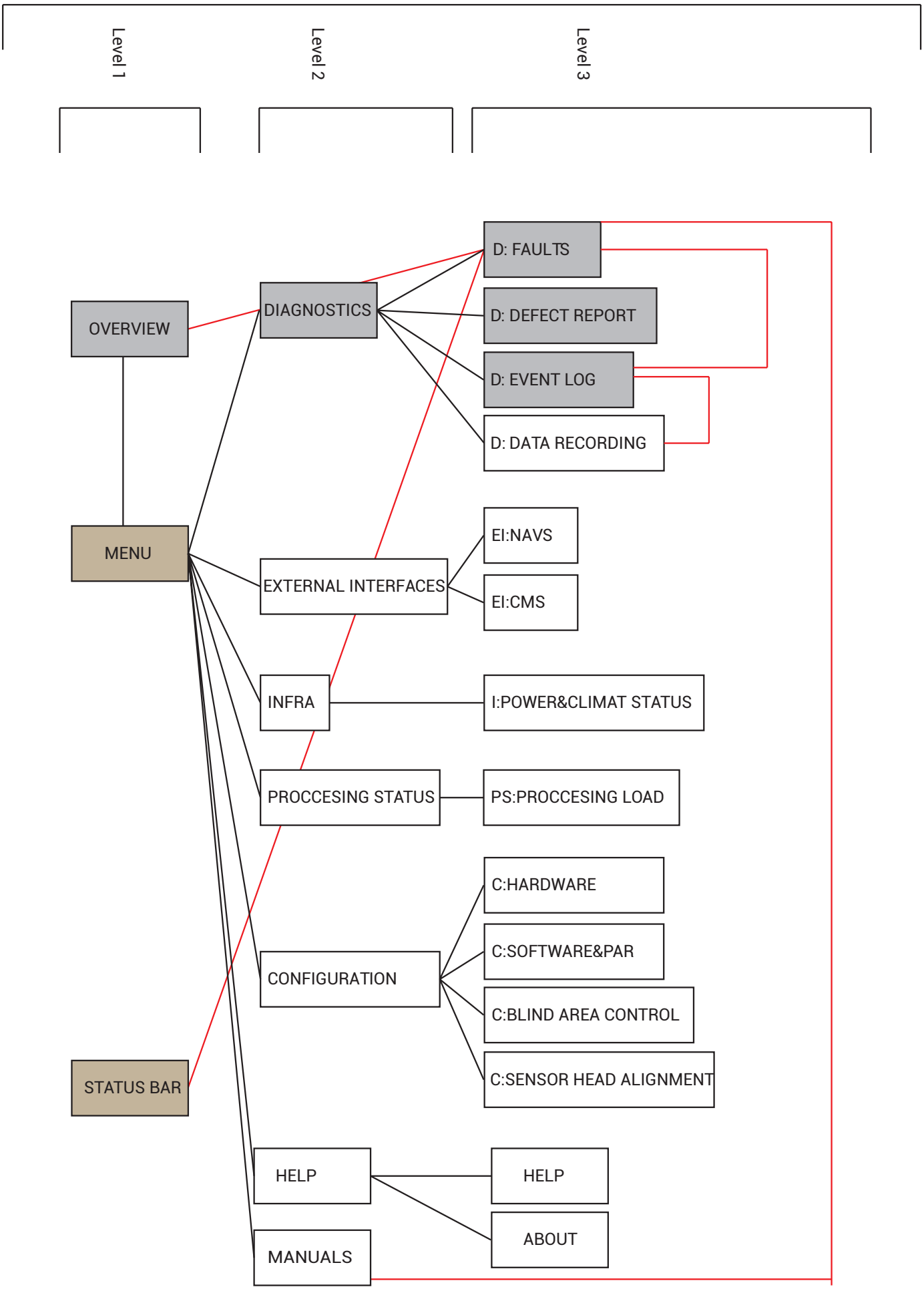
The goal of this bachelor assignment was to increase the flexibility of the MC so it can be used on a large variety of screens. The way of presenting the solution for this assignment was to establish a new guideline document which describes how to accomplish that goal. The Mobile MC guideline document describes how the current MC should be adjusted to fit the smaller and varying screen size. The focus of these guidelines lays on the Android OS running smartphone and tablet devices. This document covers the most important process steps made during the execution of the bachelor assignment. In the first chapters the research on the systems, devices, users and several guidelines are explained and how this research contributed to the establishment of the new guidelines. In the later chapters of this document, the concept generation and prototype development is explained, which in their turn, contributed to the establishment of the new guidelines.

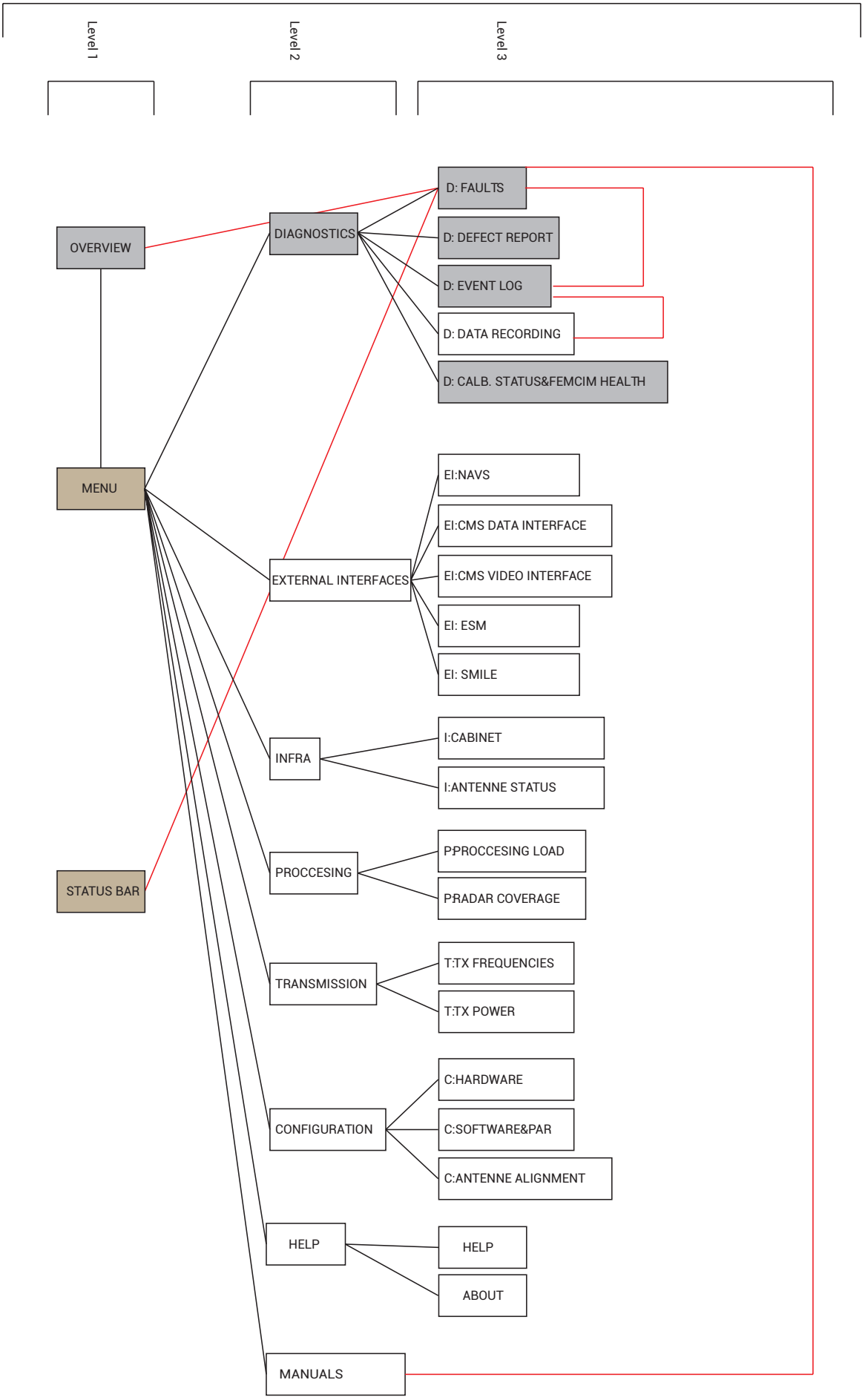
This bachelor assignment has been a preliminarily research on the mobile MC.
What is missing in this document, is the research on whether or not the guidelines are usable for the development of the new mobile MC and how the mobile MC would function in a real-world environment. This could not be included in this document because the actual development of the new mobile MC has not been started.
Also, further research is needed on whether or not the guidelines are applicable on other OS, like the upcoming new Windows 8 or Apple IOS.

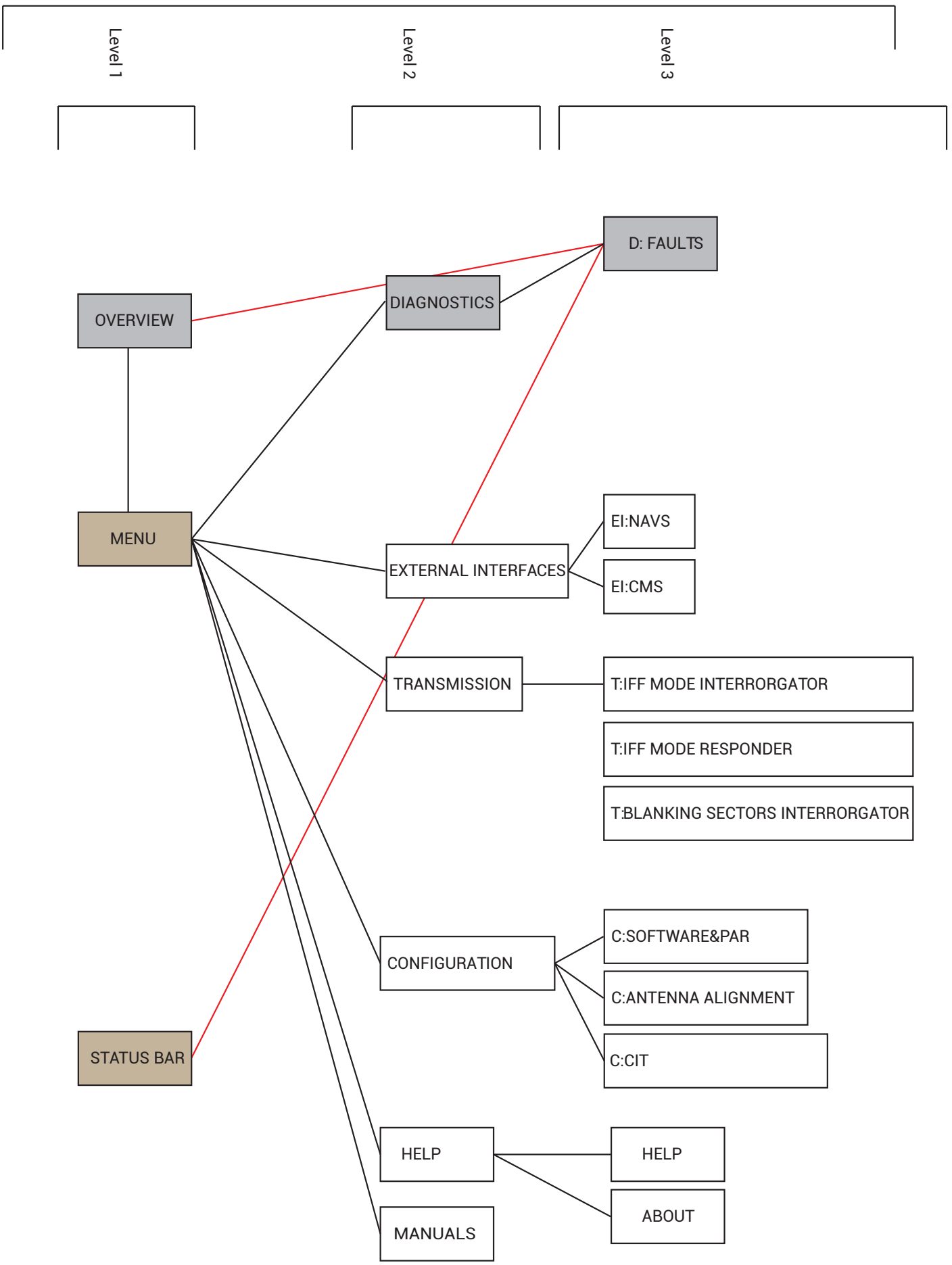

Data Flow GateKeeper And Interfaces
Temp. Sensor Cabinet
Hum. Sensor Cabinet
Door O/C Sensor Cabinet
BlowRate Sen SH1
Temp. Sensor SH1
Hum. Sensor SH1
Cleaner Fluid SH1
Status TV SH1
Status IR SH1
X 3
SH1
BlowRate Sen SH2
Temp. Sensor SH2
Hum. Sensor SH2
Cleaner Fluid SH2
Status TV SH2
Status IR SH2
X 3
SH2
BlowRate Sen SH3
Temp. Sensor SH3
Hum. Sensor SH3
Cleaner Fluid SH3
Status TV SH3
Status IR SH3
X 3
SH3
BlowRate Sen SH4
Temp. Sensor SH4
Hum. Sensor SH4
Cleaner Fluid SH4
Status TV SH4
Status IR SH4
X 3
SH4
NAVS Platform Data
CMS bus1 Status
CMS bus2 Status
CMS INTERFACE
Gatekeeper Proccesor
Gatekeeper Data Storage
GUI MC
NAVS OSDRU
Data Cable
GateKeeper System
Data Flow
External system
Internal Connection

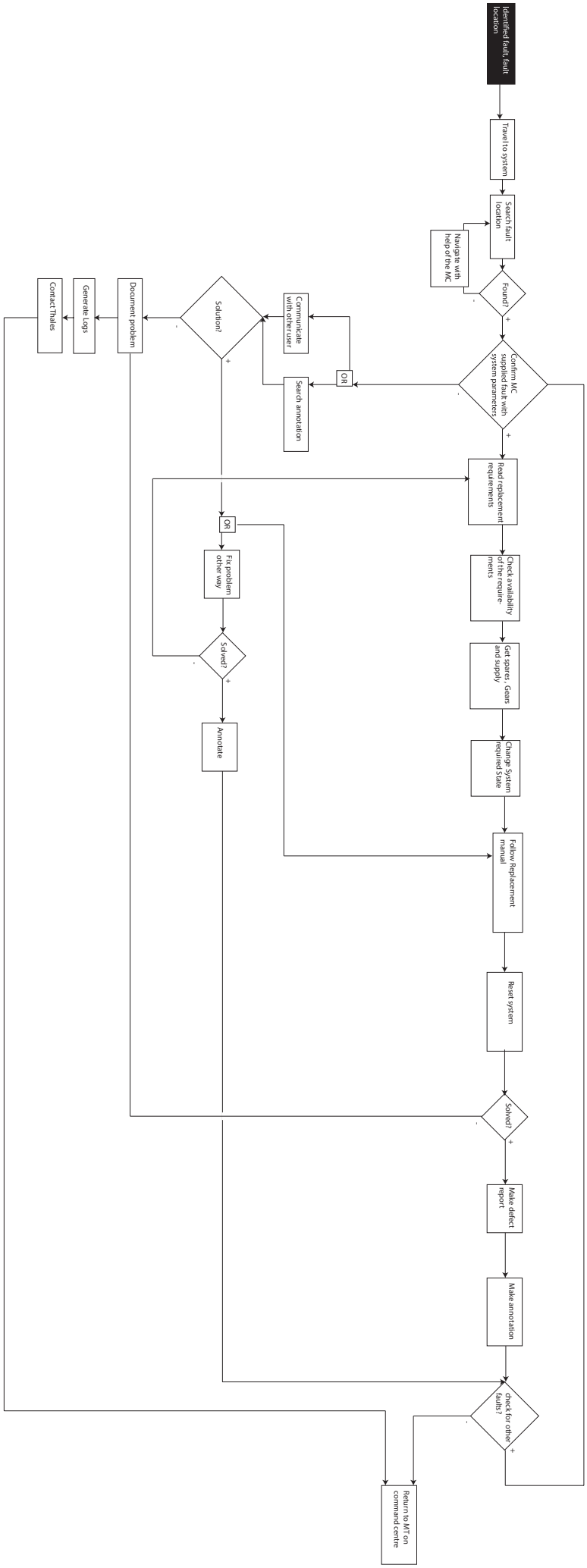

GUI Navigation in and between MC's
One Level link
Mulitble level link
Inter Interface link
Maintainer Important Screen
Note: every screen has a help function which links to a dialog box. This has not been linked due visability of the diagram
MC I-MAST
Level 1
Level 2
Level 3
Level 4
Level 5
Level 6
OVERVIEW
MENU
DIAGNOSTICS
MANUALS
HELP
NR-IFF MC
SEASTAR MC
GATEKEEPER MC
SMILE MC
ABOUT
HELP
D: FAULTS SEASTAR
D: FAULTS NR-IFF
D: FAULTS GATEKEEPER
D: FAULTS SMILE
DEK 4
DEK 3
DEK 2
DEK 1
Plaats OBJECT
Plaats OBJECT
Plaats OBJECT
Plaats OBJECT
ONDERDEEL OBJECT
ONDERDEEL OBJECT
ONDERDEEL OBJECT
ONDERDEEL OBJECT
MC SMILE
MC GATEKEEPER
MC SEASTAR
NR-IFF

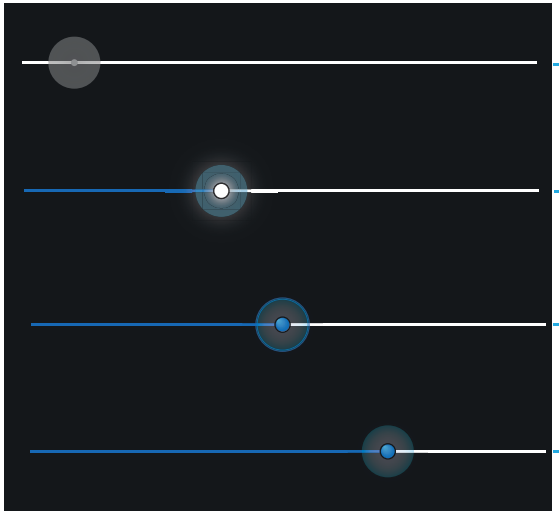

Level 1
Level 2
Level 3
OVERVIEW
MENU
STATUS BAR
DIAGNOSTICS
D: FAULTS
D: DEFECT REPORT
D: EVENT LOG
D: DATA RECORDING
D: TX/TRX CALIBRATION ANTENNE 1
D: TX/TRX CALIBRATION ANTENNE 2
D: TX/TRX CALIBRATION ANTENNE 3
D: TX/TRX CALIBRATION ANTENNE 4
D: USAGE STATISTICS
EXTERNAL INTERFACES
EI:NAVS
EI:CMS VIDEO
EI:CMS DATA
EI:IFF
EI:ESM
EI:SEASTAR
INFRA
I:CABINETS
I:ANTENNA SYSTEMS
PROCCESING STATUS
PS:DUCTING
PS:LOAD
TRANSMISSION
T:TX FREQUENCIES
T:TX POWER
CONFIGURATION
C:HARDWARE
C:SOFTWARE&PAR
C:ANTENNA ALIGNMENT
HELP
HELP
ABOUT
MANUALS


Level 1
Level 2
Level 3
OVERVIEW
MENU
STATUS BAR
DIAGNOSTICS
D: FAULTS
D: DEFECT REPORT
D: EVENT LOG
D: DATA RECORDING
EXTERNAL INTERFACES
EI:NAVS
EI:CMS
INFRA
I:POWER&CLIMAT STATUS
PROCCESING STATUS
PS:PROCCESING LOAD
CONFIGURATION
C:HARDWARE
C:SOFTWARE&PAR
C:BLIND AREA CONTROL
C:SENSOR HEAD ALIGNMENT
HELP
HELP
ABOUT
MANUALS


Level 1
Level 2
Level 3
OVERVIEW
MENU
STATUS BAR
DIAGNOSTICS
EXTERNAL INTERFACES
INFRA
PROCCESING
TRANSMISSION
CONFIGURATION
HELP
MANUALS
D: FAULTS
D: DEFECT REPORT
D: EVENT LOG
D: DATA RECORDING
D: CALB. STATUS&FEMCIM HEALTH
EI:NAVS
EI:CMS DATA INTERFACE
EI:CMS VIDEO INTERFACE
EI: ESM
EI: SMILE
I:CABINET
I:ANTENNE STATUS
P:PROCCESING LOAD
P:RADAR COVERAGE
T:TX FREQUENCIES
T:TX POWER
C:HARDWARE
C:SOFTWARE&PAR
C:ANTENNE ALIGNMENT
HELP
ABOUT


Level 1
Level 2
Level 3
OVERVIEW
MENU
STATUS BAR
DIAGNOSTICS
D: FAULTS
EXTERNAL INTERFACES
EI:NAVS
EI:CMS
TRANSMISSION
T:IFF MODE INTERRORGATOR
T:IFF MODE RESPONDER
T:BLANKING SECTORS INTERRORGATOR
CONFIGURATION
C:SOFTWARE&PAR
C:ANTENNA ALIGNMENT
C:CIT
HELP
HELP
ABOUT
MANUALS


Identified fault fault location
Travel to system
Search fault location
Navigate with help of the MC
Found?
Confirm MC supplied fault with system parameters
OR
Search annotation
Communicate with other user
Solution?
Document problem
Generate Logs
Contact Thales
Read replacement requirements
OR
Fix problem other way
Solved?
Annotate
Check availability of the require-ments
Get spares, Gears and supply
Change System required State
Follow Replacement manual
Reset system
Solved?
Make defect report
Make annotation
Check for other faults?
Return to MT on command centre

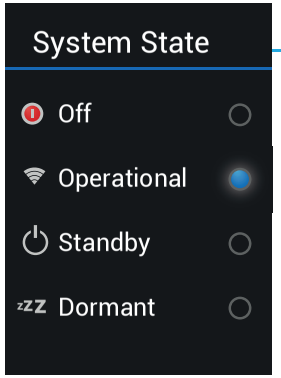


Slider Disabled

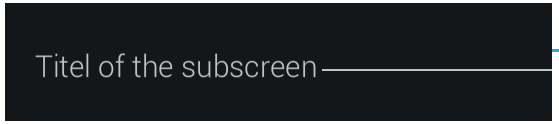
Slider Pressed

Slider Focussed

Slider Normal



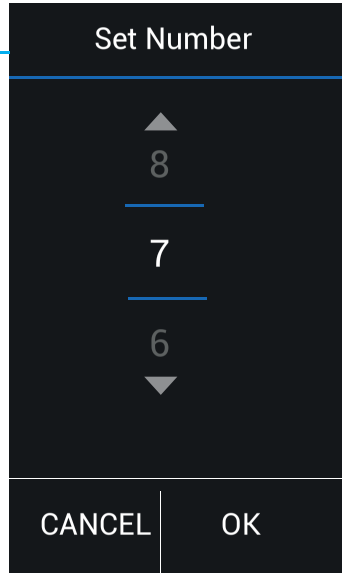
Configuration menu The user can use the configuration menu to selected the multiple options.



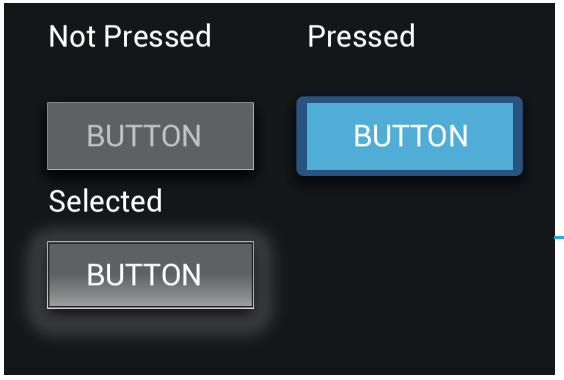
Titels Titels in small letters with an horizontal line to help divide the screen

Progress bar The progress bar is used to indicate the advantagements of the procces. Can be a bar or a circel

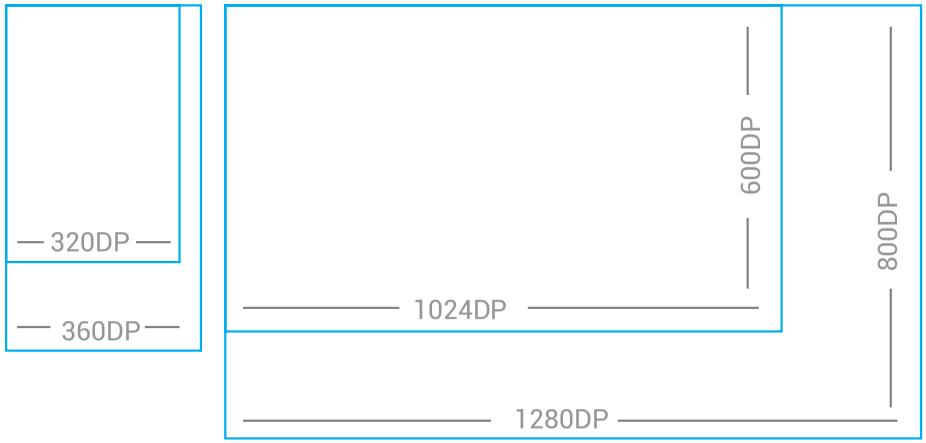
Pickers Used to pick a singele value of a parameter. Can be controlled with the arrow button indicators, with a swipe gesture or a keyboard input.

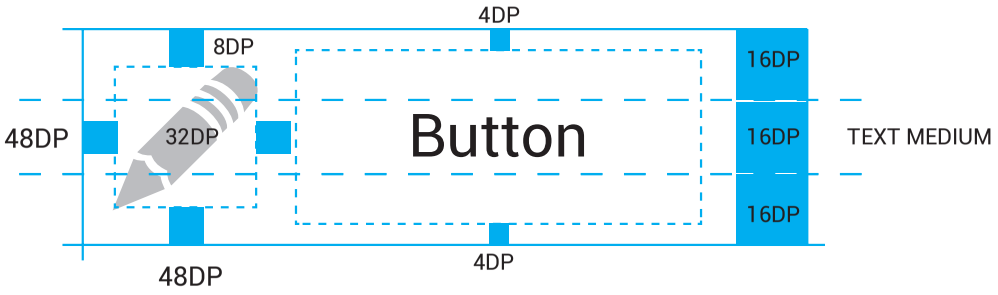


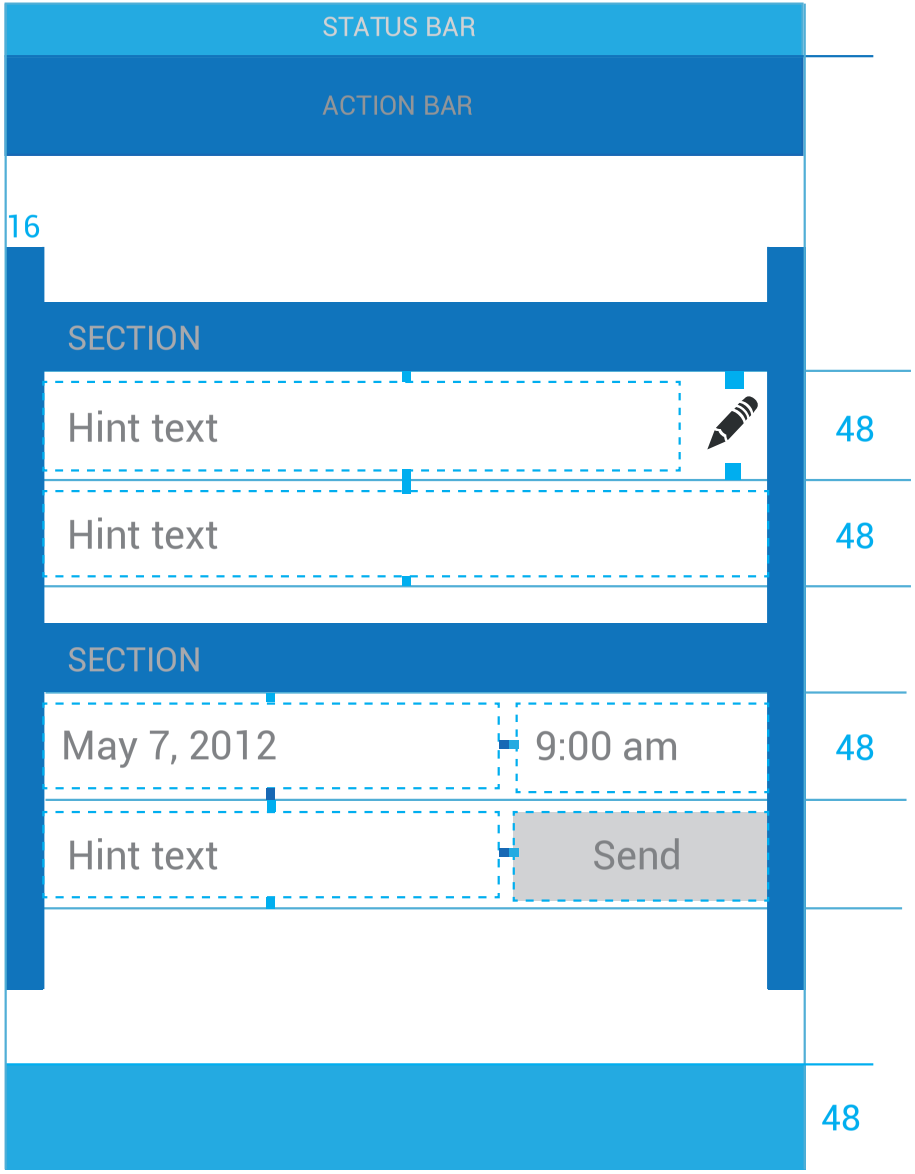
Check boxes These checkboxes can be used for a true or false statement. The ON/OFF boxes can be swiped.

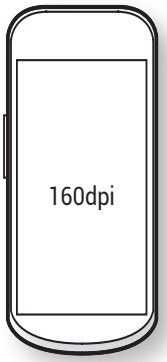


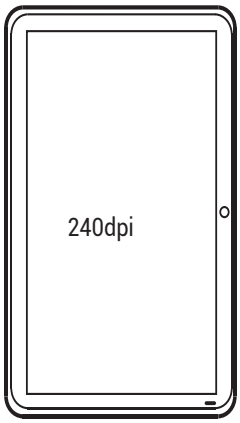
Buttons Buttons are used to mediate actions. When pressed, the buttons provides the user with feedback

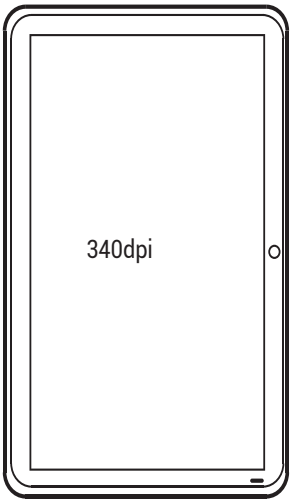

320DP
360DP
600DP
1024DP
800DP
1280DP


4DP
8DP
48DP
32DP
Button
16DP
16DP
16DP
TEXT MEDIUM
48DP
4DP

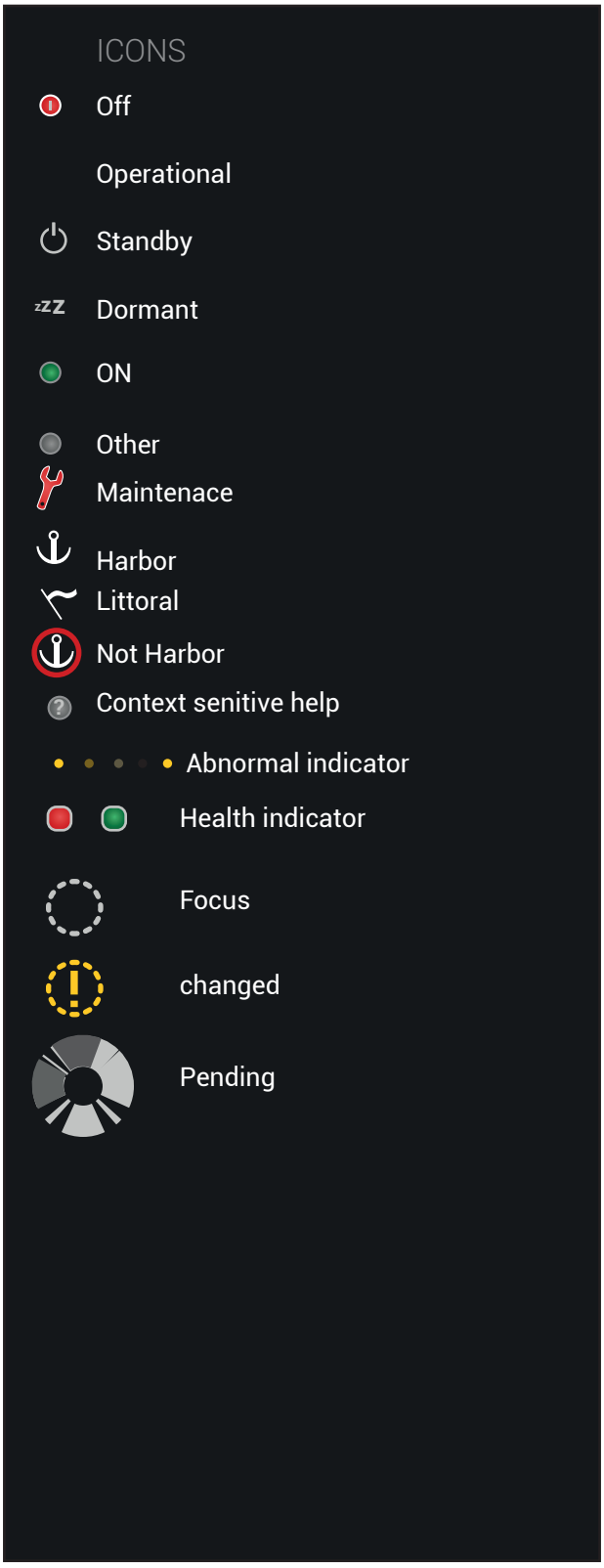

STATUS BAR
ACTION BAR
16
SECTION
Hint text
48
Hint text
48
SECTION
May 7, 2012
9:00 am
48
Hint text
Send
48







ACTION BAR	DIALOG ICONS	ListView ICONS	STATUSBAR ICONS	TAB BAR ICONS	
				Full Asset	Icon
18X18 px	24X24 px	24X24 px	18X18 px	24X24 px	22X22 px
24X24 px	32X32 px	32X32 px	24X24 px	32X32 px	28X28 px
36X36 px	48X48 px	48X48 px	36X36 px	48X48 px	42X42 px
48X48 px	64X64 px	64X64 px	48X48 px	64X64 px	54X54 px


ICONS
Off
Operational
Standby
Dormant
ON
Other
Maintenace
Harbor
Littoral
Not Harbor
Context senitive help
Abnormal indicator
Health indicator
Focus
changed
Pending


Statusbar Displays pending notifications on the left and status, such as time, battery level, or signal strength, on the right. Swipe down from the status bar to show notification details.
Action Bar Availible Tabs for navigation, displays current tab with indicator and tab stack overflow. Also the application icon to the left with the up button can exists in the action bar.
Action Bar Spinner menu. Click to drop-out menu for more options.
Action bar Availible actions for current application screen, can be shown/hides with the navigation bar.
Navigation Bar New for phones in Android 4.0, the navigation bar is present only on devices that don't have the traditional hardware keys. It houses the device navigation controls Back, Home, and Recents, and also displays a menu for apps written for Android 2.3 or earlier.
Pop-up screen The lightweight version of the dialog boxes. They require only a singel action from the user. It lets the user choose how to continu their workflow
Combined Bar On tablet form factors the status and navigation bars are combined into a single bar at the bottom of the screen
NotificationsThe notification system allows your app to keep the user informed about important events, such as new messages in a chat app or a calendar event. Swipe down from statusbar to engage.
Dialogue boxesThe dialogue boxes are for feedback only. Only used when an important potentially harmfull action is going to be preformed.
Toast
TAB 2
TAB 3
TAB 4
Wensday
MAY 2, 2012
Day
Week
Moth
May 2, 2012
Error while loading
3:22 PM
Power surge
3:60PM
1 missed call
2:44 PM
Remove account
Are you really sure?
Yes
No
Update
Share contact via
Phone
Bluethoot
Email
USB
Interweb
Local
4:00

Concepts: Overview Landscape&Portrait

1

2

Current Mode: Operational or Maintenace Action Button

MC Icon Gatekeeper

Up button

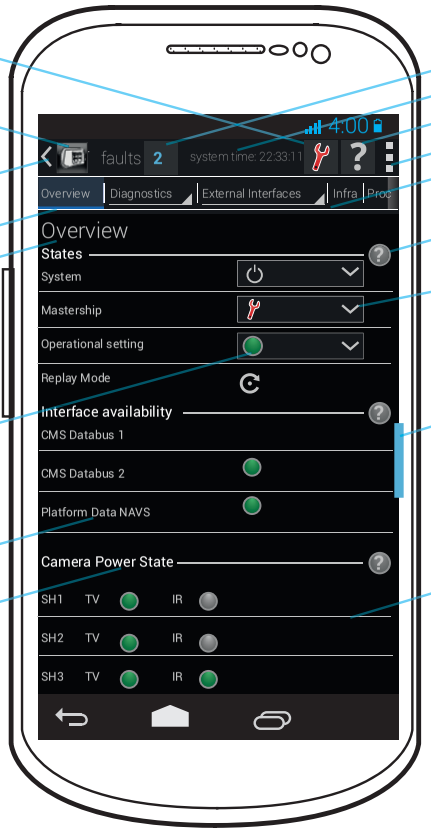
Current Selected tab

Current Selected Screen Titel

State Indicator Current Selected

Object parameter

Sub context devision Titel



Number of faults, links to Diagnostics Fault screen

System time

Application Help

Action bar overflow

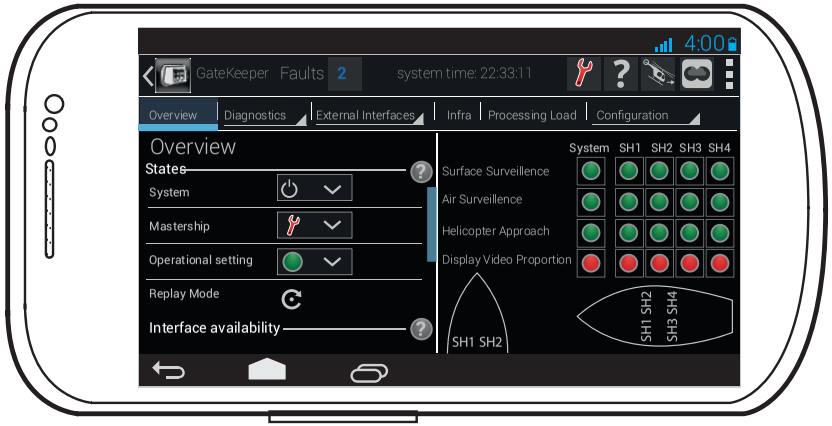
Spinner for dropdown menu

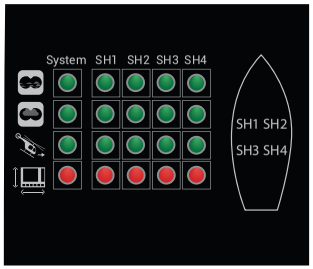
Context Help button

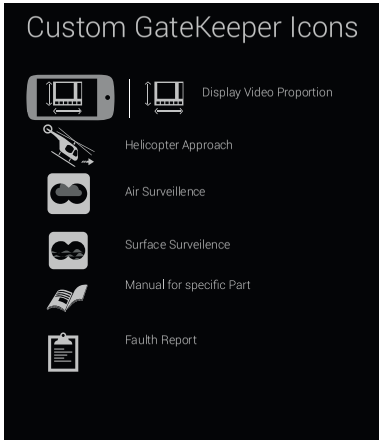
State Selection box

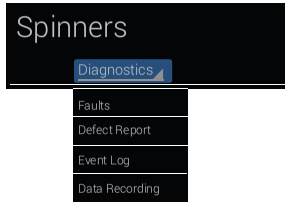
Scroll Bar

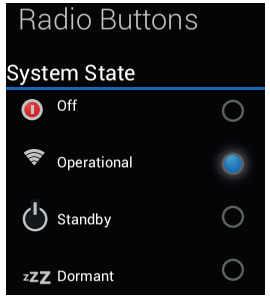
List view Devider





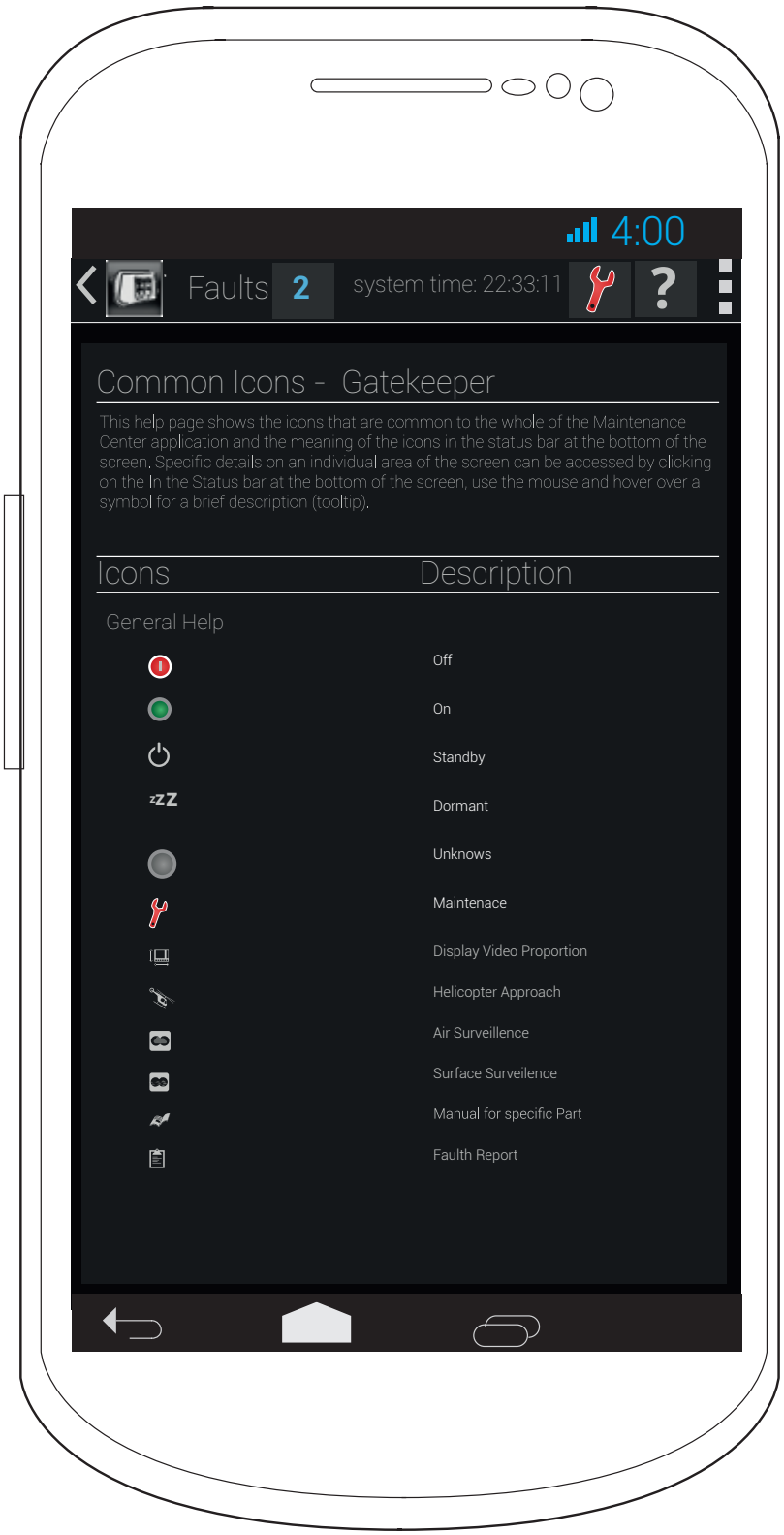




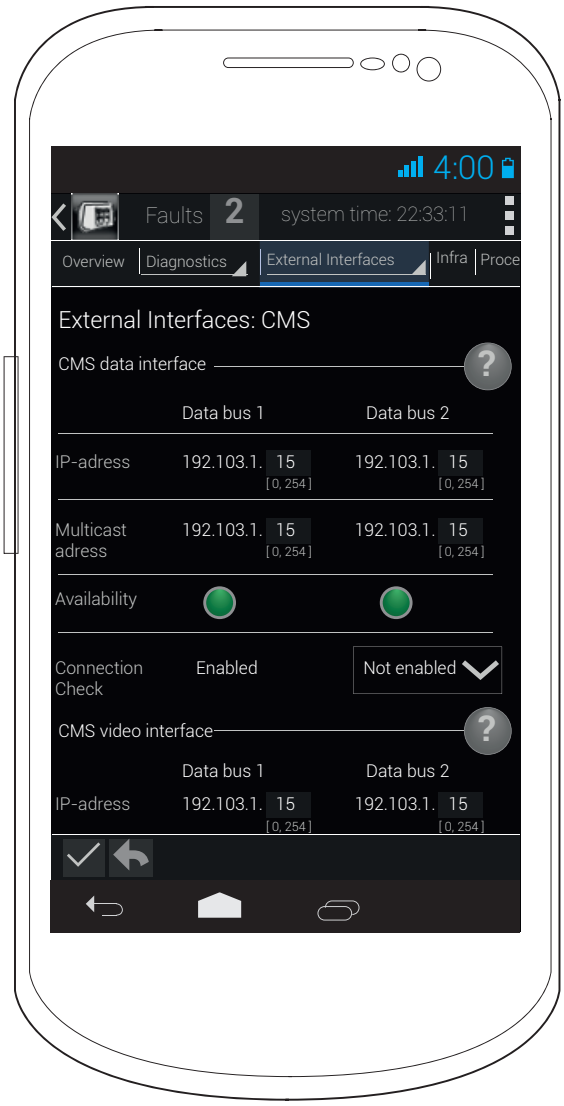


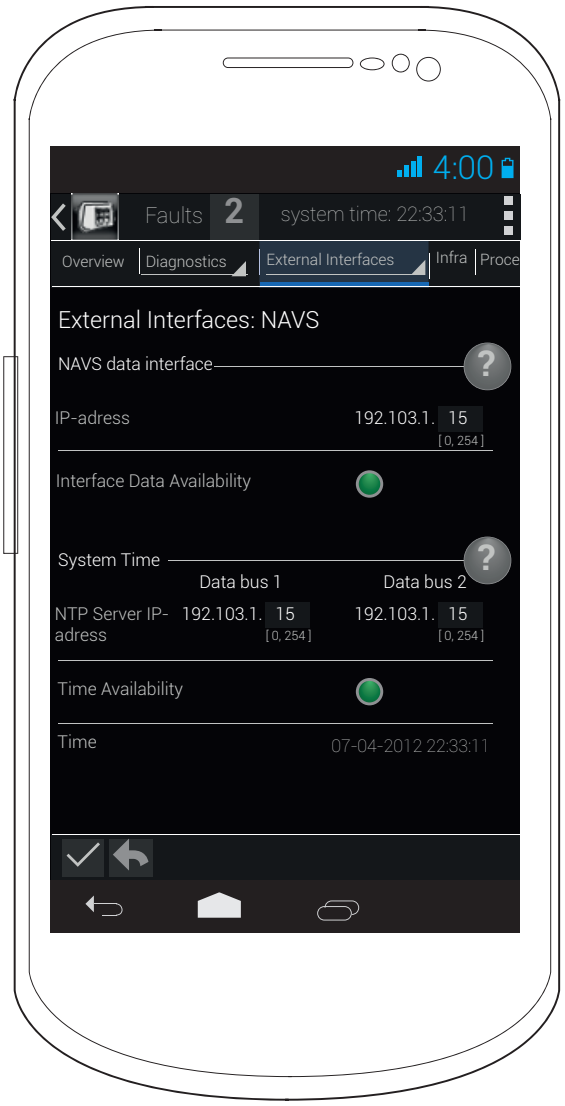
Overview

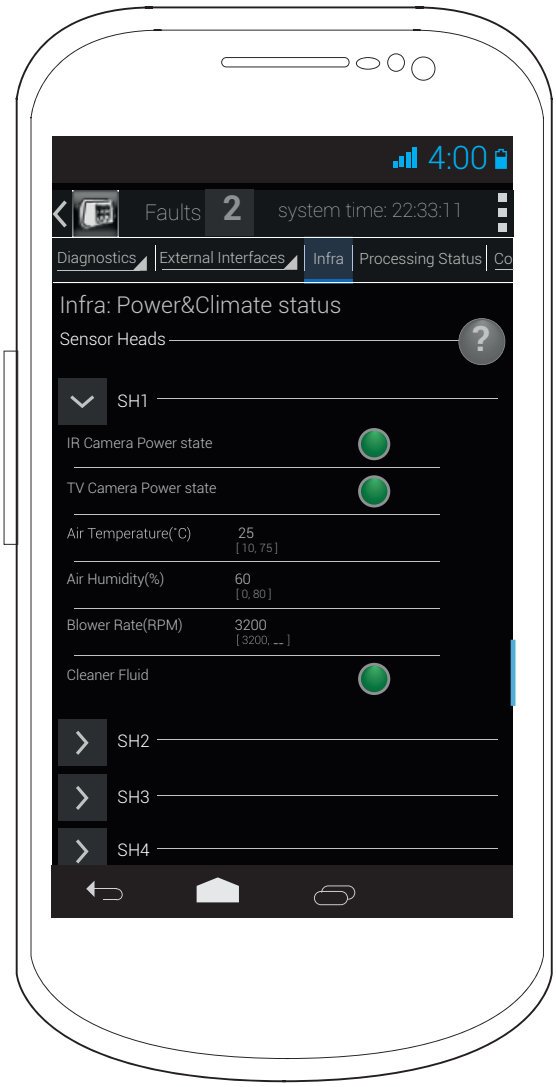

Faults 2
system time 223311
Diagnostics: Faults
Overview
Diagnostics
External Interfaces
Surface Surveillence
Air Surveillence
Helicopter Approach
Display Video Proportion
select all
deselect all
System SH1 SH2 SH3 SH4
SH1 SH2
SH3 SH4
Selected Capabilities Faults
Fault id
Time
Worst Condition
2134568
05-04-2012 10:00:00
FAILED
CRITICAL
Fault id 2134568 Description
Both CMS Interfaces Heartbeat Timeout
Causes of fault
Priority
Part Location
Part Number
Ethernet Switch
PC / E / 20
PC / F / 19
PC / E / 22
Test 23415234
Test 25232344
Diagnostics: Faults selection
Description Something is wrong with Part B
Description Something is wrong with part A
PC / E / 21
PC / F / 22
Test 201022
Test 232133

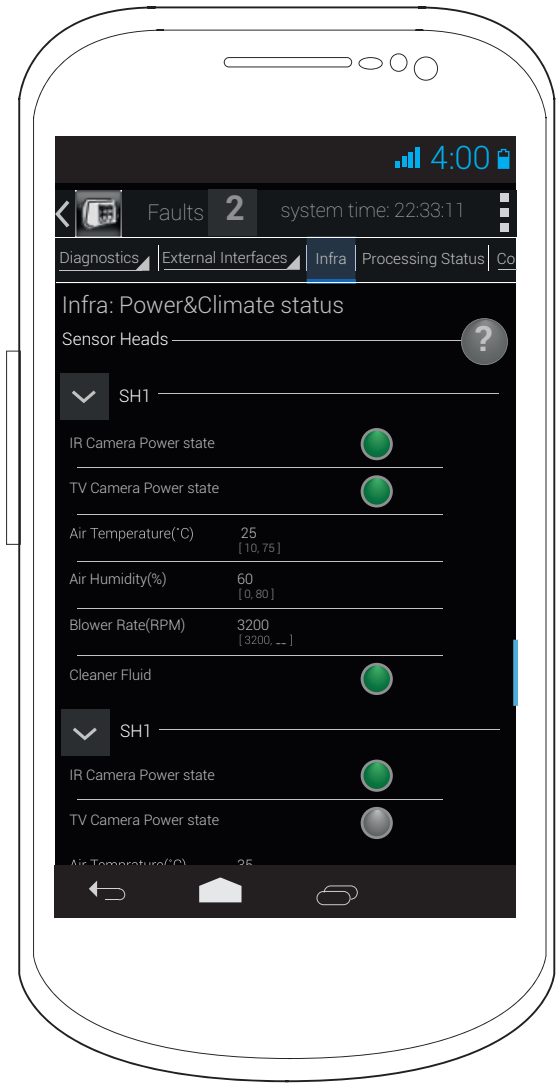

4:00
Faults 2
system time: 22:33:11
Common Icons - Gatekeeper
This help page shows the icons that are common to the whole of the Maintenance Center application and the meaning of the icons in the status bar at the bottom of the screen. Specific details on an individual area of the screen can be accessed by clicking on the In the Status bar at the bottom of the screen, use the mouse and hover over a symbol for a brief description (tooltip).
Icons
Description
General Help
Off
On
Standby
zzZ
Dormant
Unknows
Maintenace
Display Video Proportion
Helicopter Approach
Air Surveillence
Surface Surveilence
Manual for specific Part
Faulth Report

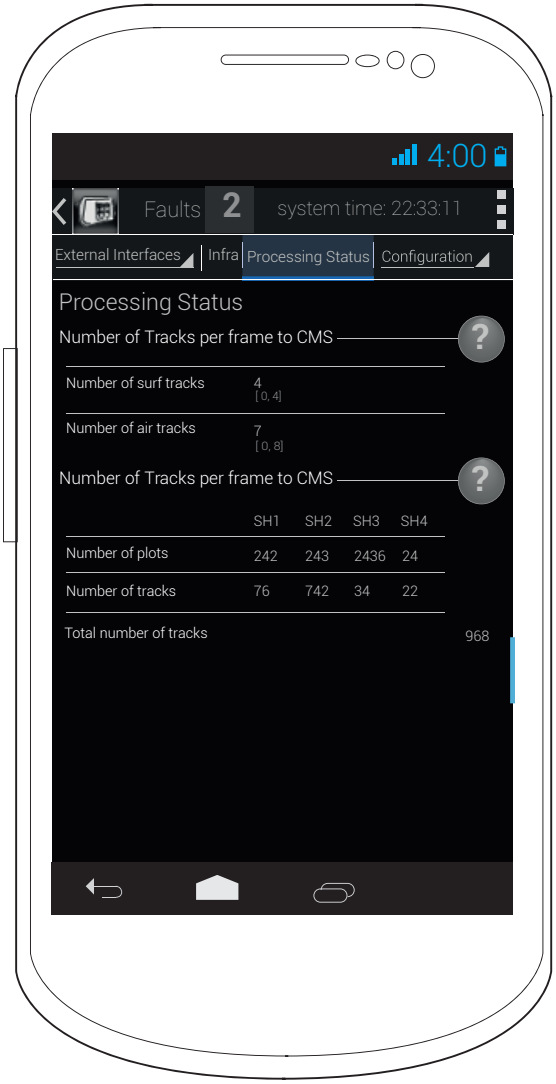

4:00
Faults 2
system time: 22:33:11
Overview
Diagnostics
External Interfaces
Infra
Proce
Diagnostics: Defect Report
Failure information
Time of Detection *
[YYYY-DD-MM hh:mm:ss]
Faulth ID
Description
Faulthy Part
Part Number
Part Serial Number
Part Version
4:00
Faults 2
system time: 22:33:11
Description
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
?123

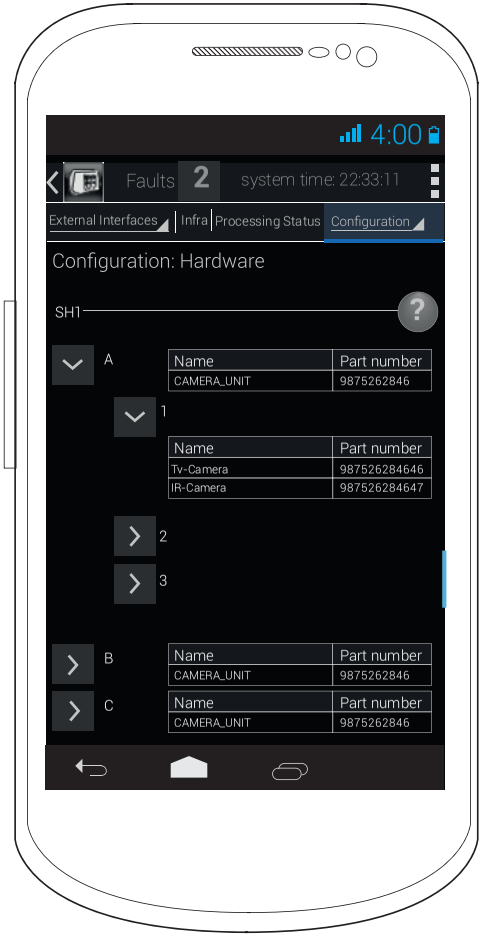

4:00
Faults 2
system time: 22:33:11
Overview
Diagnostics
External Interfaces
Infra
Proce
External Interfaces: CMS
CMS data interface
Data bus 1
Data bus 2
IP-adress
192.103.1. 15 [0, 254]
192.103.1. 15 [0, 254]
Multicast adress
192.103.1. 15 [0, 254]
192.103.1. 15 [0, 254]
Availability
Connection Check
Enabled
Not enabled
CMS video interface
Data bus 1
Data bus 2
IP-adress
192.103.1. 15 [0, 254]
192.103.1. 15 [0, 254]

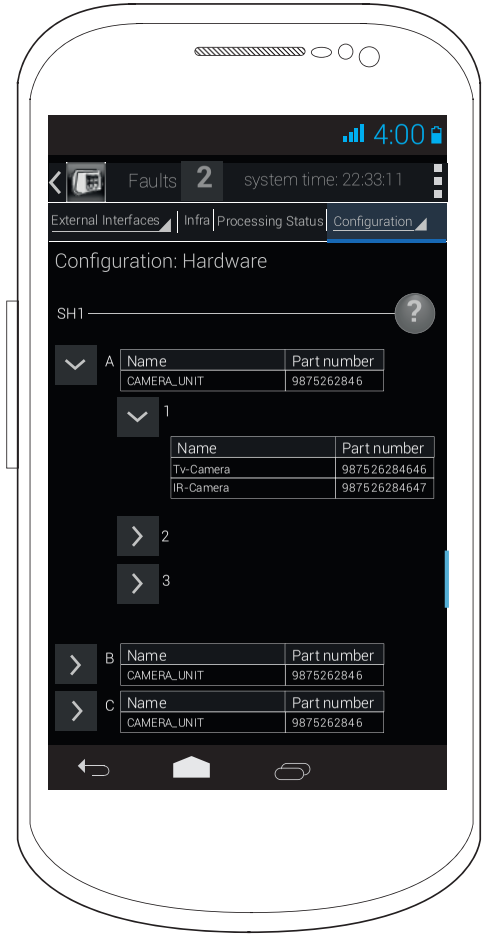

4:00
Faults 2
system time: 22:33:11
Overview
Diagnostics
External Interfaces
Infra
Proce
External Interfaces: NAVS
NAVS data interface
IP-adress
192.103.1. 15 [0, 254]
Interface Data Availability
System Time
Data bus 1
Data bus 2
NTP Server IP-adress
192.103.1. 15 [0, 254]
192.103.1. 15 [0, 254]
Time Availability
Time
07-04-2012 22:33:11

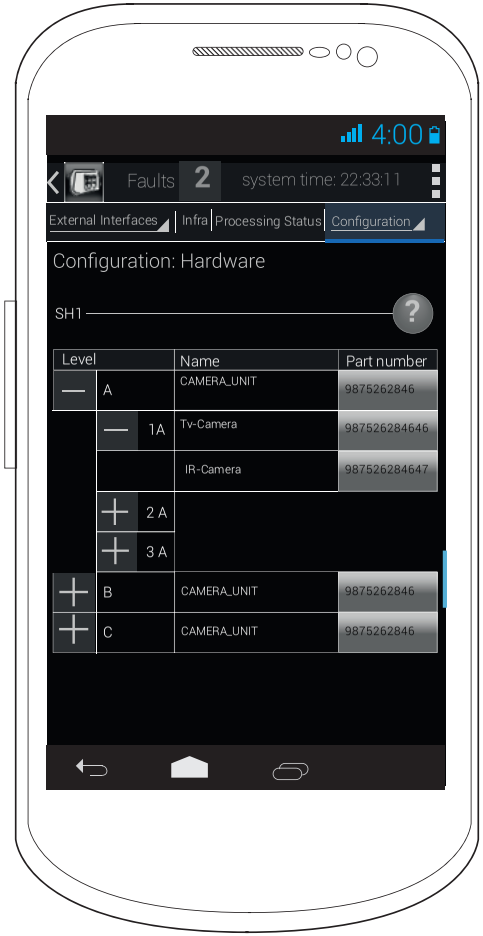

4:00
Faults 2
system time: 22:33:11
Diagnostics
External Interfaces
Infra
Processing Status
Co
Infra: Power&Climate status
Sensor Heads
SH1
IR Camera Power state
TV Camera Power state
Air Temperature(˚C) 25 [10, 75]
Air Humidity(%) 60 [0, 80]
Blower Rate(RPM) 3200 [3200, --]
Cleaner Fluid
SH2
SH3
SH4

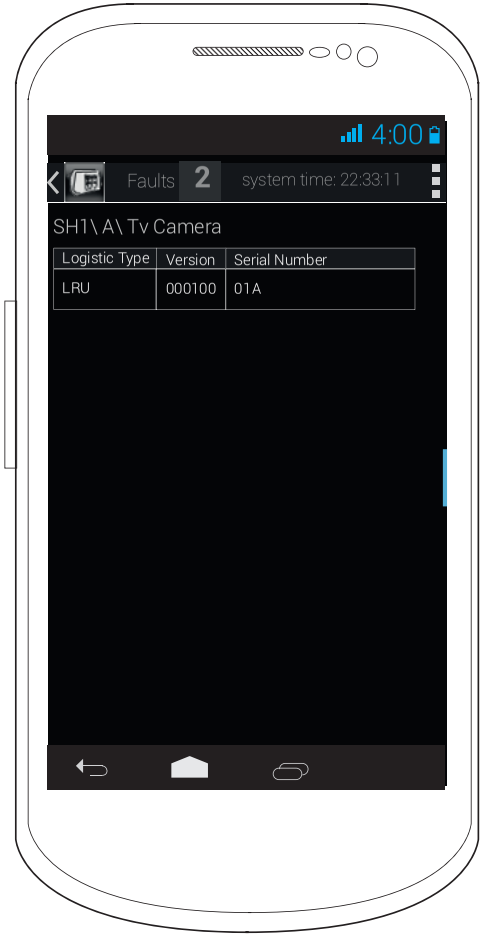

4:00
Faults 2
system time: 22:33:11
Diagnostics
External Interfaces
Infra
Processing Status
Co
Infra: Power&Climate status
Sensor Heads
SH1
IR Camera Power state
TV Camera Power state
Air Temperature(˚C) 25 [10, 75]
Air Humidity(%) 60 [0, 80]
Blower Rate(RPM) 3200 [3200, --]
Cleaner Fluid
SH1
IR Camera Power state
TV Camera Power state

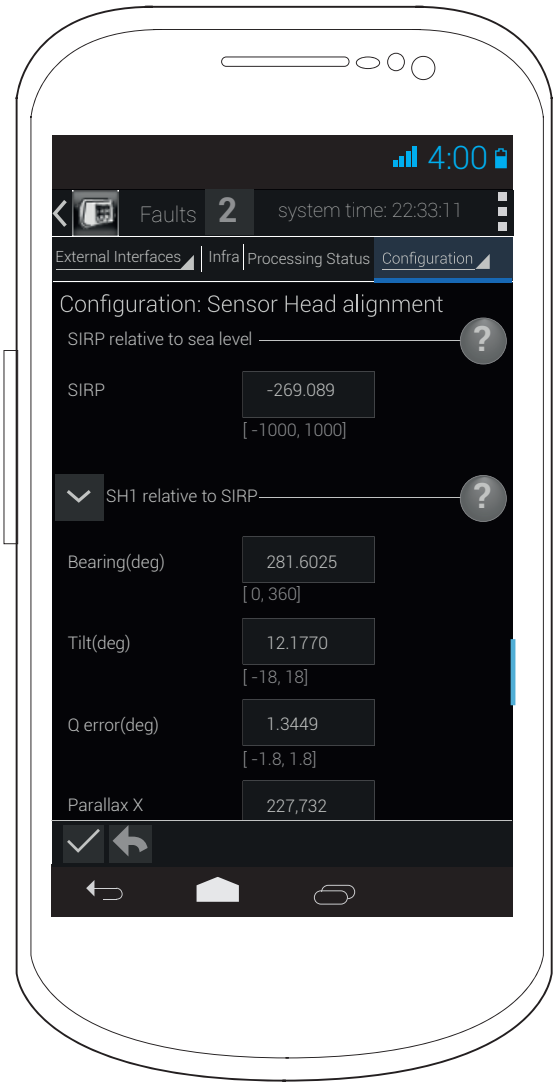

4:00
Faults 2
system time: 22:33:11
External Interfaces
Infra
Processing Status
Configuration
Processing Status
Number of Tracks per frame to CMS
Number of surf tracks
4
[0, 4]
Number of air tracks
7
[0, 8]
Number of Tracks per frame to CMS
SH1 SH2 SH3 SH4
Number of plots 242 243 2436 24
Number of tracks 76 742 34 22
Total number of tracks
968

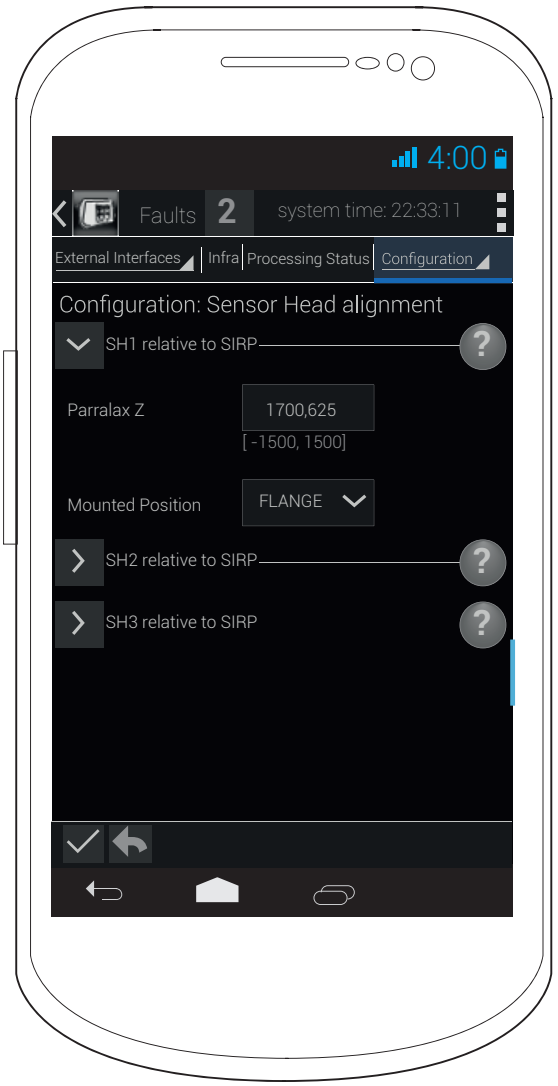

4:00
Faults 2 system time: 22:33:11
External Interfaces Infra Processing Status Configuration
Configuration: Hardware
SH1
A
Name Part number
CAMERA_UNIT 9875262846
1
Name Part number
Tv-Camera 987526284646
IR-Camera 987526284647
2
3
B
Name Part number
CAMERA_UNIT 9875262846
C
Name Part number
CAMERA_UNIT 9875262846

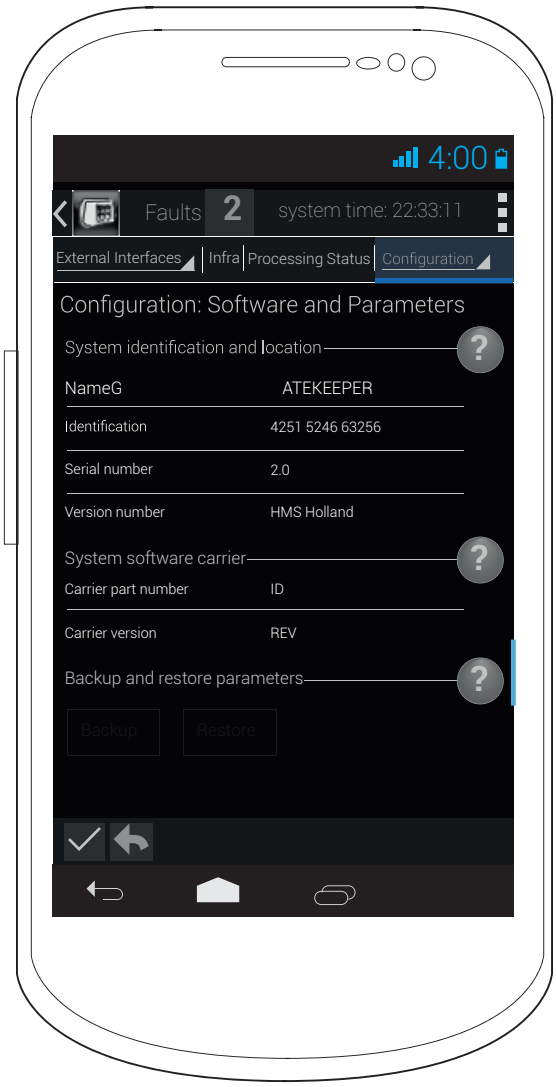

4:00
Faults 2 system time: 22:33:11
External Interfaces Infra Processing Status Configuration
Configuration: Hardware
SH1
A
Name Part number
CAMERA_UNIT 9875262846
1
Name Part number
Tv-Camera 987526284646
IR-Camera 987526284647
2
3
B
Name Part number
CAMERA_UNIT 9875262846
C
Name Part number
CAMERA_UNIT 9875262846


4:00
Faults 2 system time: 22:33:11
External Interfaces Infra Processing Status Configuration
Configuration: Hardware
SH1
Level Name Part number
A CAMERA_UNIT 9875262846
1A Tv-Camera 987526284646
IR-Camera 987526284647
2 A
3 A
B CAMERA_UNIT 9875262846
C CAMERA_UNIT 9875262846


4:00
Faults 2 system time: 22:33:11
SH1\ A\ Tv Camera
Logistic Type Version Serial Number
LRU 000100 01A


4:00
Faults 2
system time: 22:33:11
External Interfaces
Infra
Processing Status
Configuration
Configuration: Sensor Head alignment
SIRP relative to sea level
SIRP
-269.089
[-1000, 1000]
SH1 relative to SIRP
Bearing(deg)
281.6025
[0, 360]
Tilt(deg)
12.1770
[-18, 18]
Q error(deg)
1.3449
[-1.8, 1.8]
Parallax X
227,732


4:00
Faults 2
system time: 22:33:11
External Interfaces
Infra
Processing Status
Configuration
Configuration: Sensor Head alignment
SH1 relative to SIRP
Parralax Z
1700,625
[-1500, 1500]
Mounted Position
FLANGE
SH2 relative to SIRP
SH3 relative to SIRP


4:00
Faults 2
system time: 22:33:11
External Interfaces
Infra
Processing Status
Configuration
Configuration: Software and Parameters
System identification and location
NameG
ATEKEEPER
Identification
4251 5246 63256
Serial number
2.0
Version number
HMS Holland
System software carrier
Carrier part number
ID
Carrier version
REV
Backup and restore parameters
Backup
Restore


4:00
system time: 22:33:11
Faults
2
SH1 Camera 2 Mask

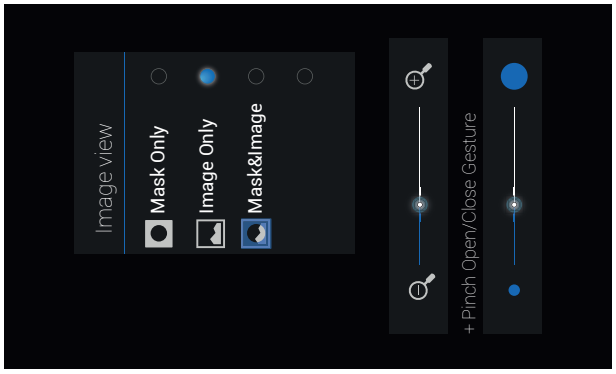
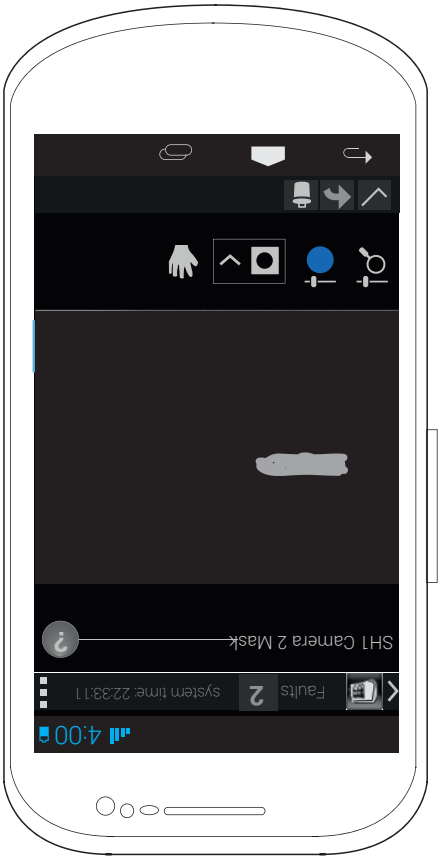
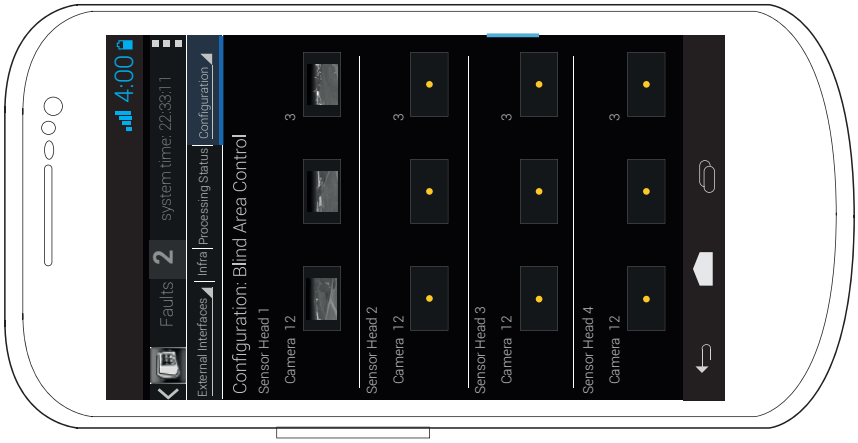
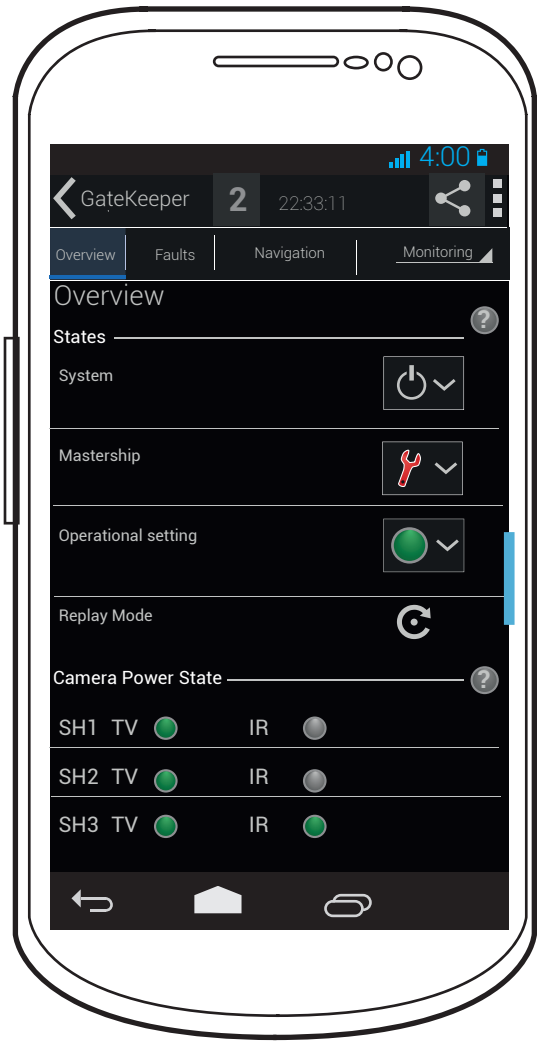


Image view
Mask Only
Image Only
Mask&Image
+ Pinch Open/Close Gesture


4:00
system time: 22:33:11
Faults
2
SH1 Camera 2 Mask


4:00
system time: 22:33:11
Faults
2
SH1 Camera 2 Mask


4:00
system time: 22:33:11
Faults
2
External Interfaces
Infra
Processing Status
Configuration
Configuration: Blind Area Control
Sensor Head 1
Camera 12
Sensor Head 2
Camera 12
Sensor Head 3
Camera 12
Sensor Head 4
Camera 12


4:00
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Deselect all
Show Faults
Faults selection
Fault id
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2134568
05-04-2012 10:00:00
FAILED
Both CMS Interfaces Heartbeat Timeout
2134562
05-04-2012 10:00:00
CRITICAL
Something is wrong with Part B
2134564
05-04-2012 10:00:00
CRITICAL
Something is wrong with part A
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Description
Both CMS Interfaces Heartbeat Timeout
Causes of fault
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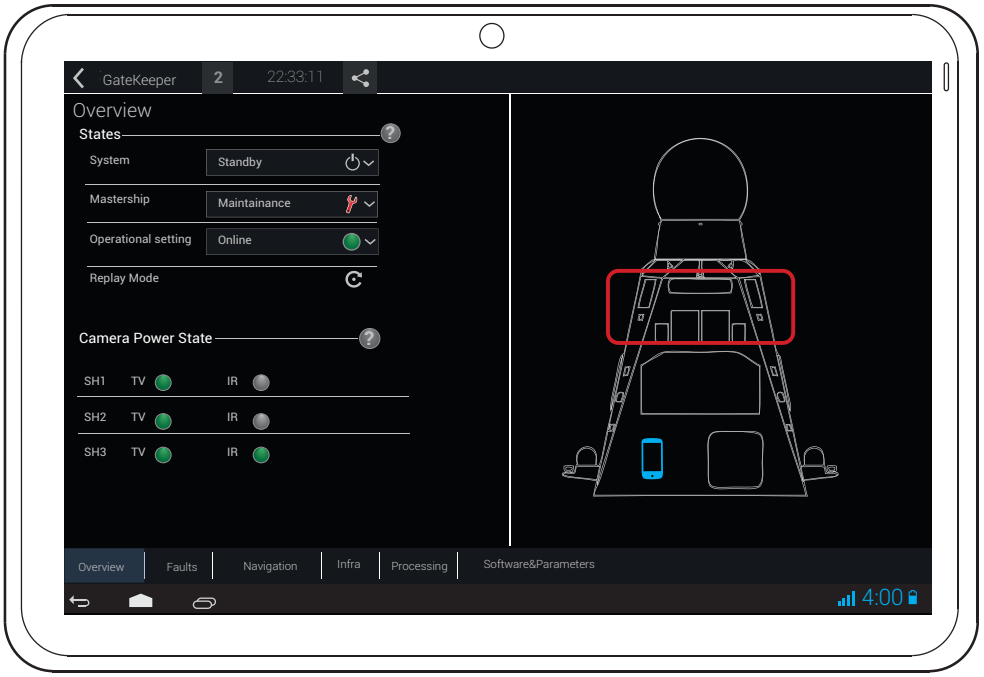
Part Location
1
PC / E / 20
Ethernet Switch
2
PC / E / 21
Part A


GateKeeper
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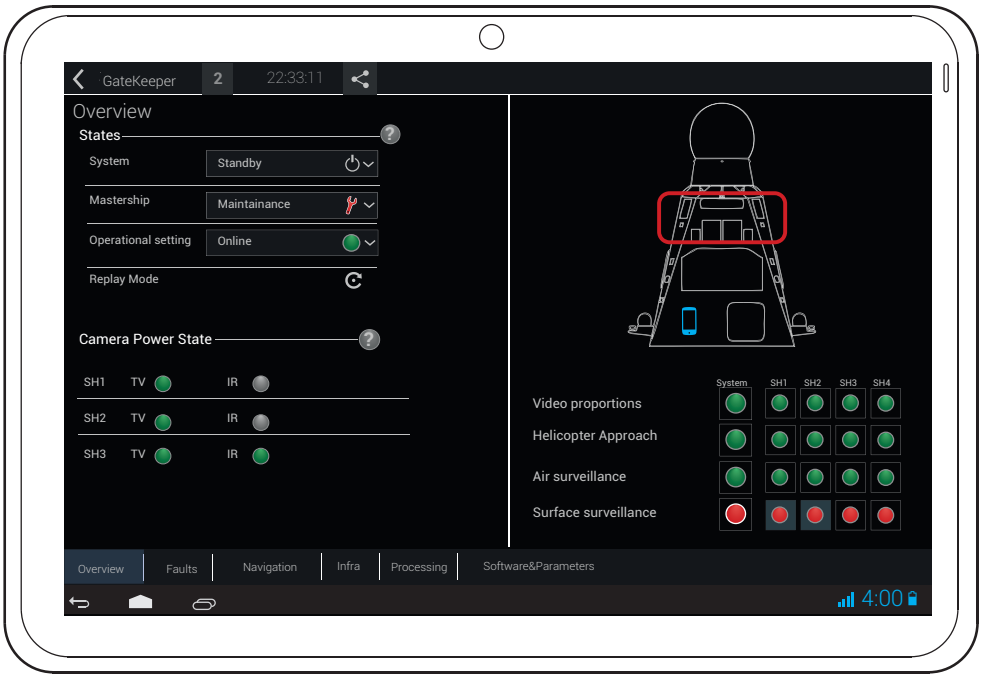
GateKeeper
2
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05-04-2012 10:00:00
FAILED
Both CMS Interfaces Heartbeat Timeout
2134562
05-04-2012 10:00:00
CRITICAL
Something is wrong with Part B
2134564
05-04-2012 10:00:00
CRITICAL
Something is wrong with part A
Fault id 2134568
Description
Both CMS Interfaces Heartbeat Timeout
Causes of fault
Priority
Part Location
1
PC / E / 20
Ethernet Switch
2
PC / E / 21
Part A
Overview
Faults
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Fault Report
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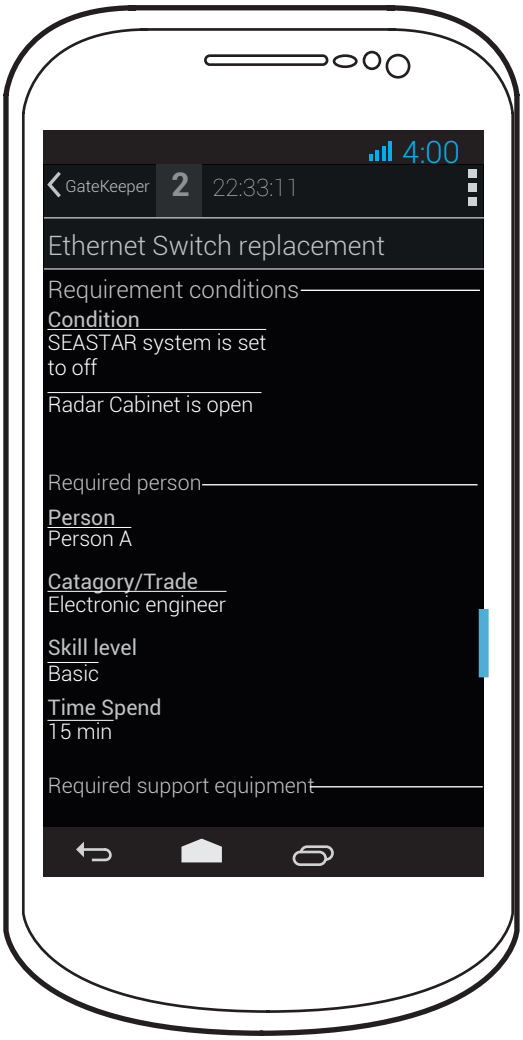
Requirements Replacement Part



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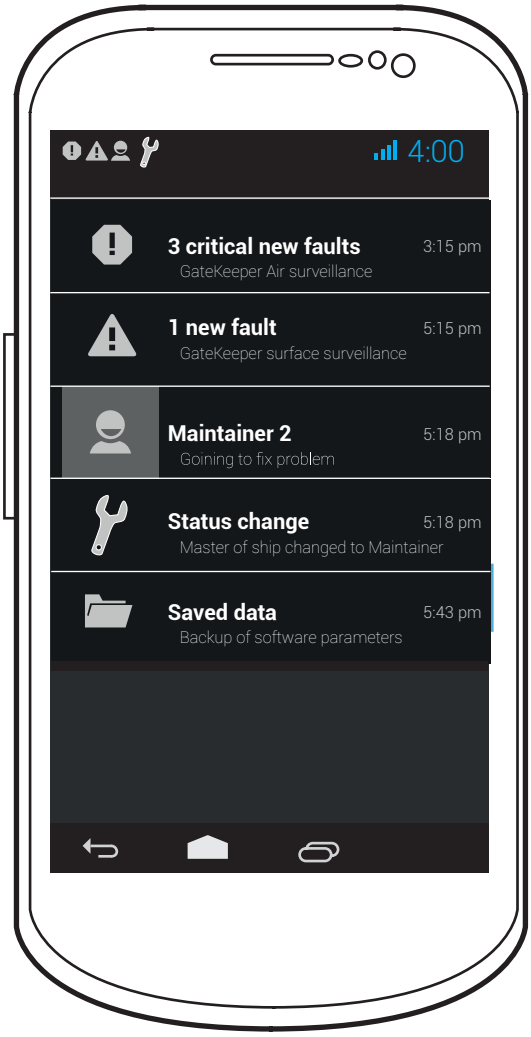


4:00
GateKeeper
2
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4:00
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Infra
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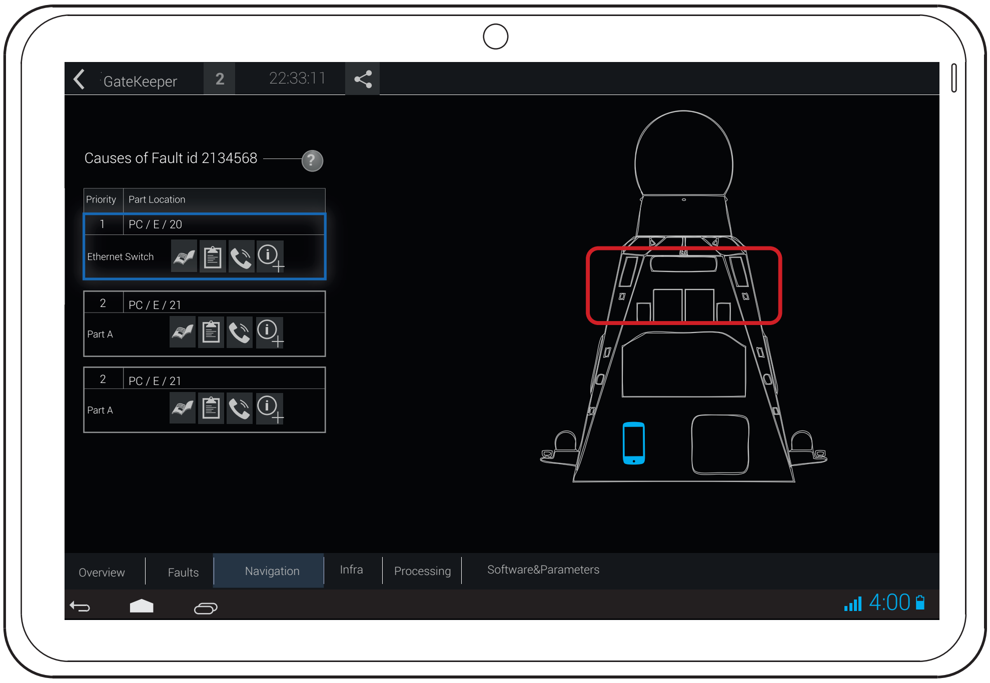
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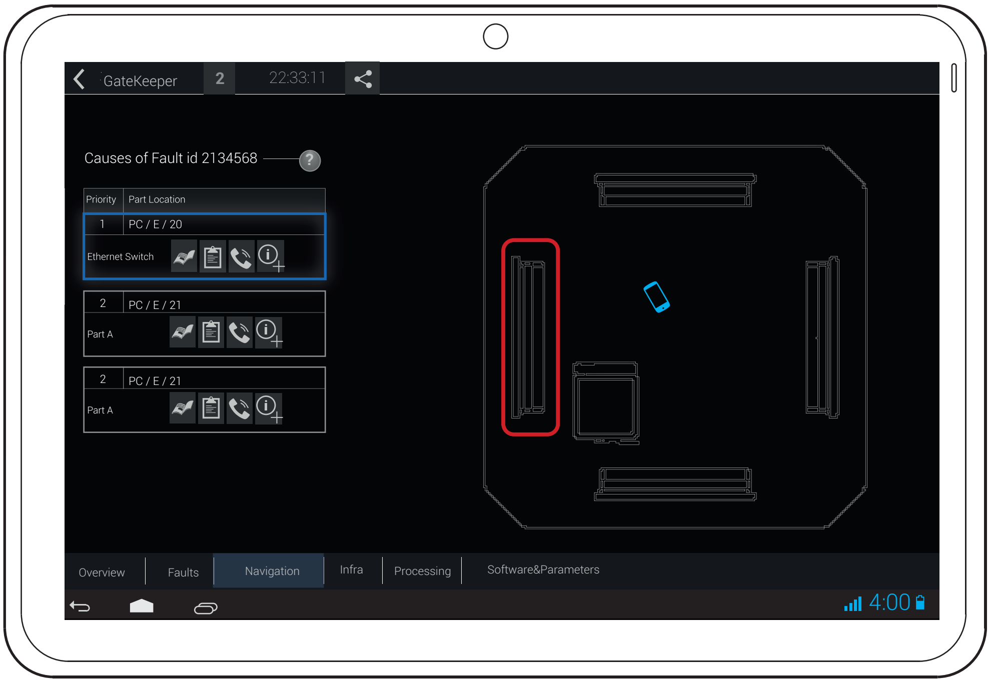
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Causes of Fault id 2134568
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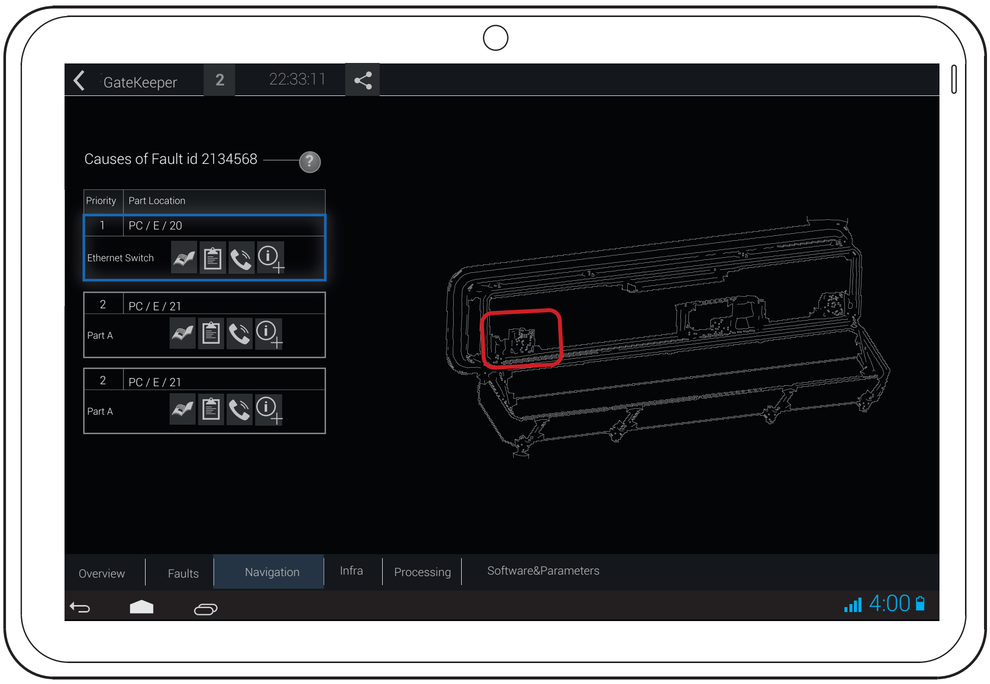
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Causes of Fault id 2134568
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Part Location
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Ethernet Switch
2
PC / E / 21
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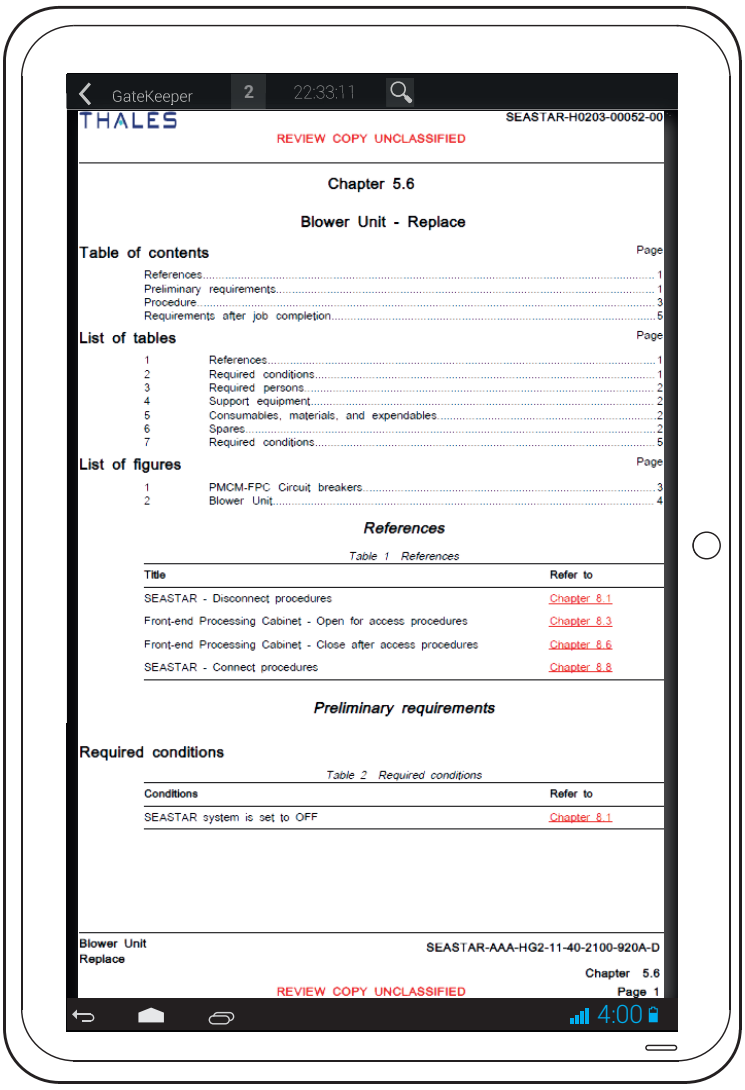
GateKeeper
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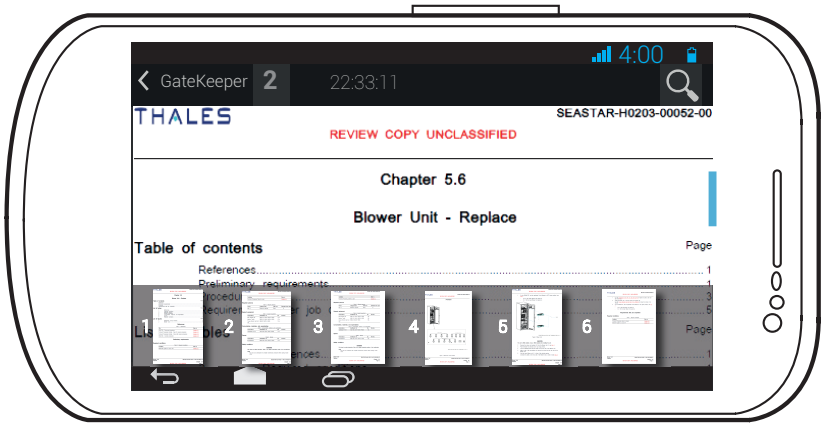
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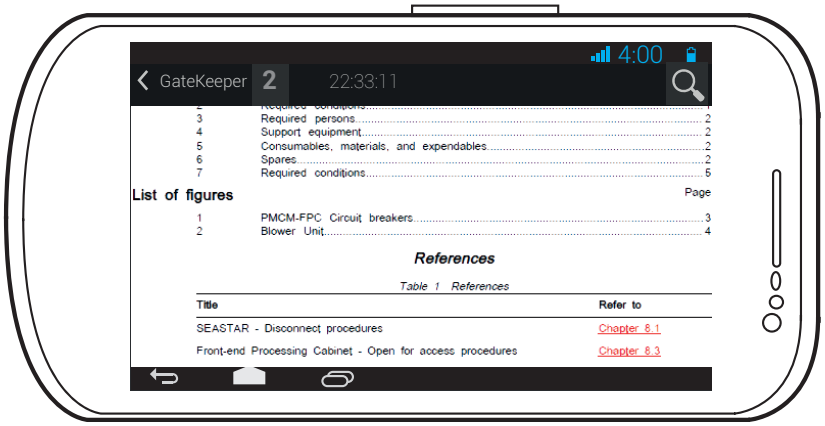
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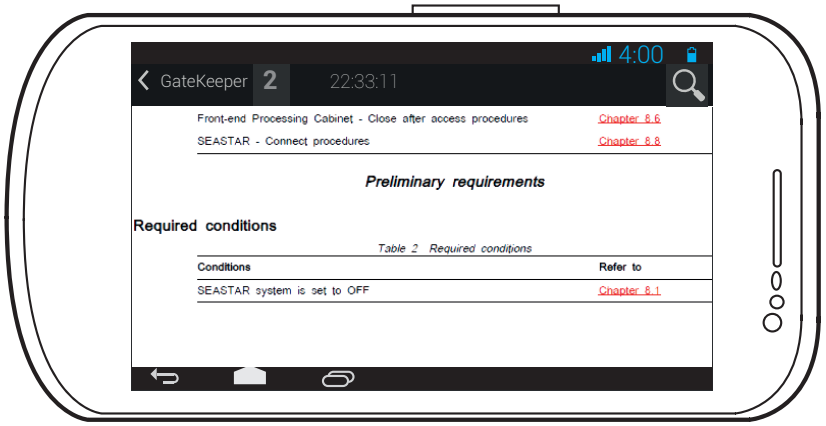
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SEASTAR - Connect procedures
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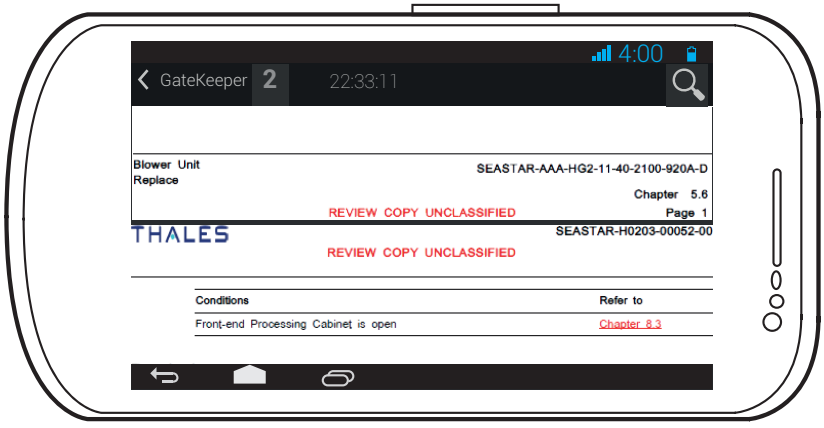
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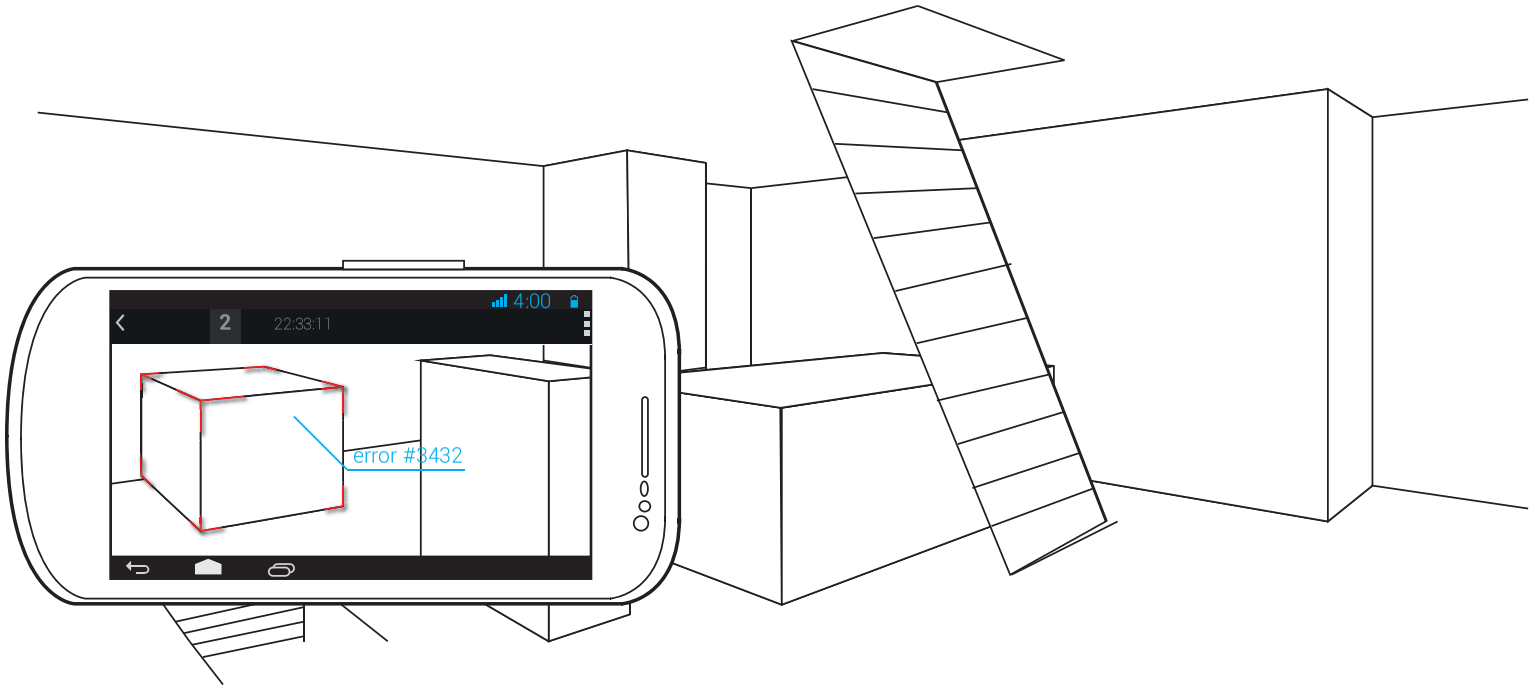
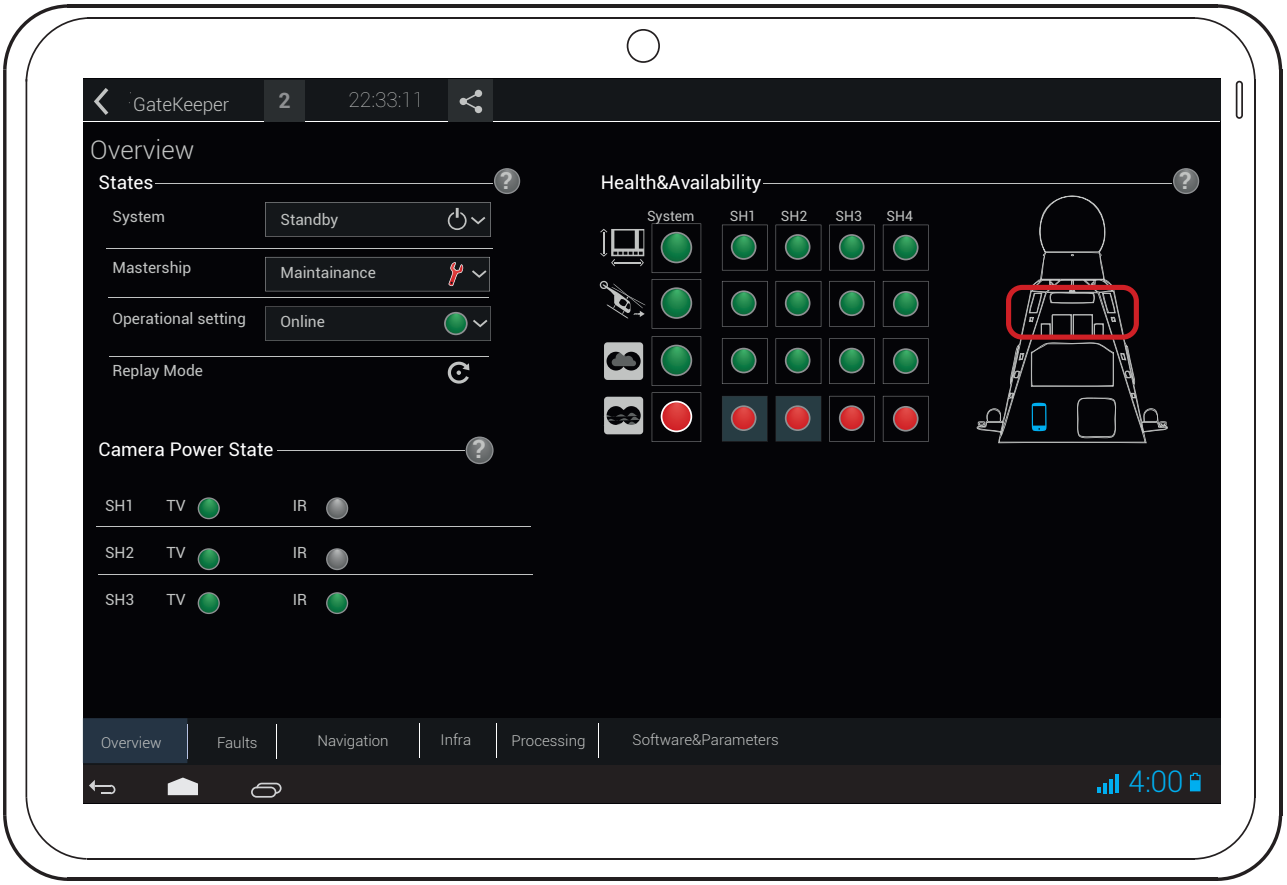


Error navigation and identification trough augmented reality feedback. The image feed of the camera is mixed in with a 3d model of the structure. On top of the structure, fault idication lines can be seen in combination with an error message or a fault code. This approach makes otimal use of the smartphone. It utilizes its camera, positioning capabilities and computing power. The user can quickly can the area to locate the faults object position.


GateKeeper
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SH3 TV IR
Health&Availability
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SH1
SH2
SH3
SH4
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Faults
Navigation
Infra
Processing
Software&Parameters
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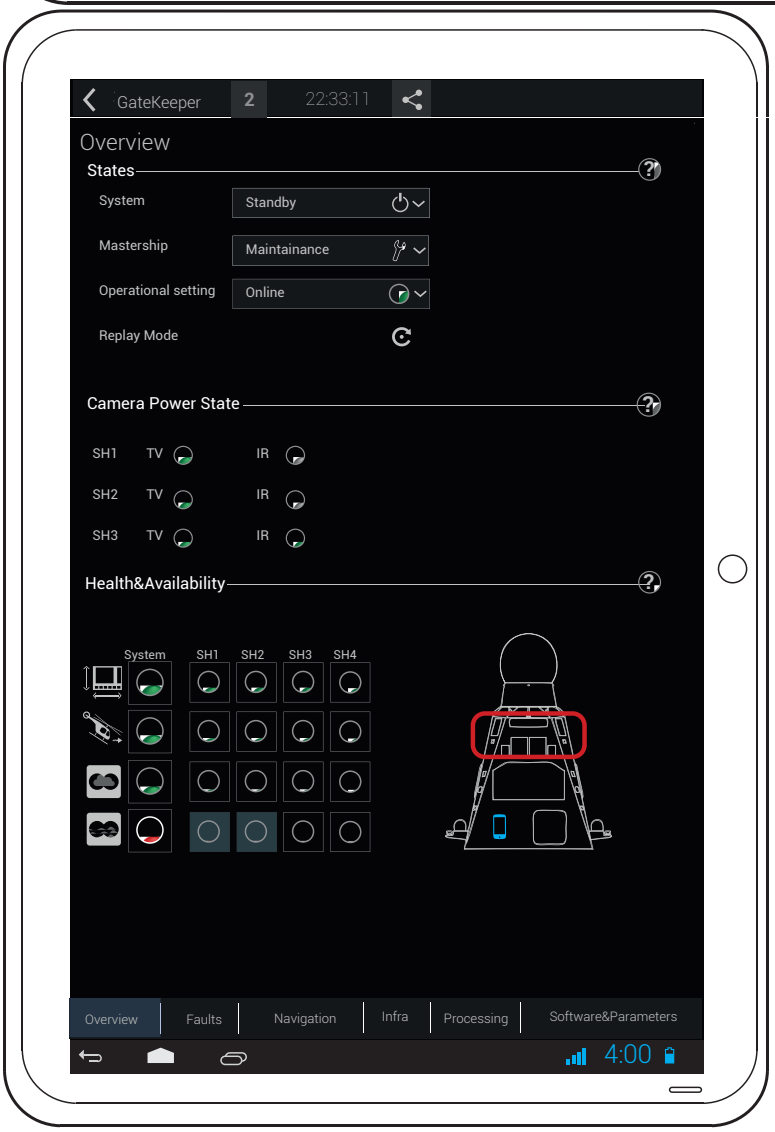
GateKeeper
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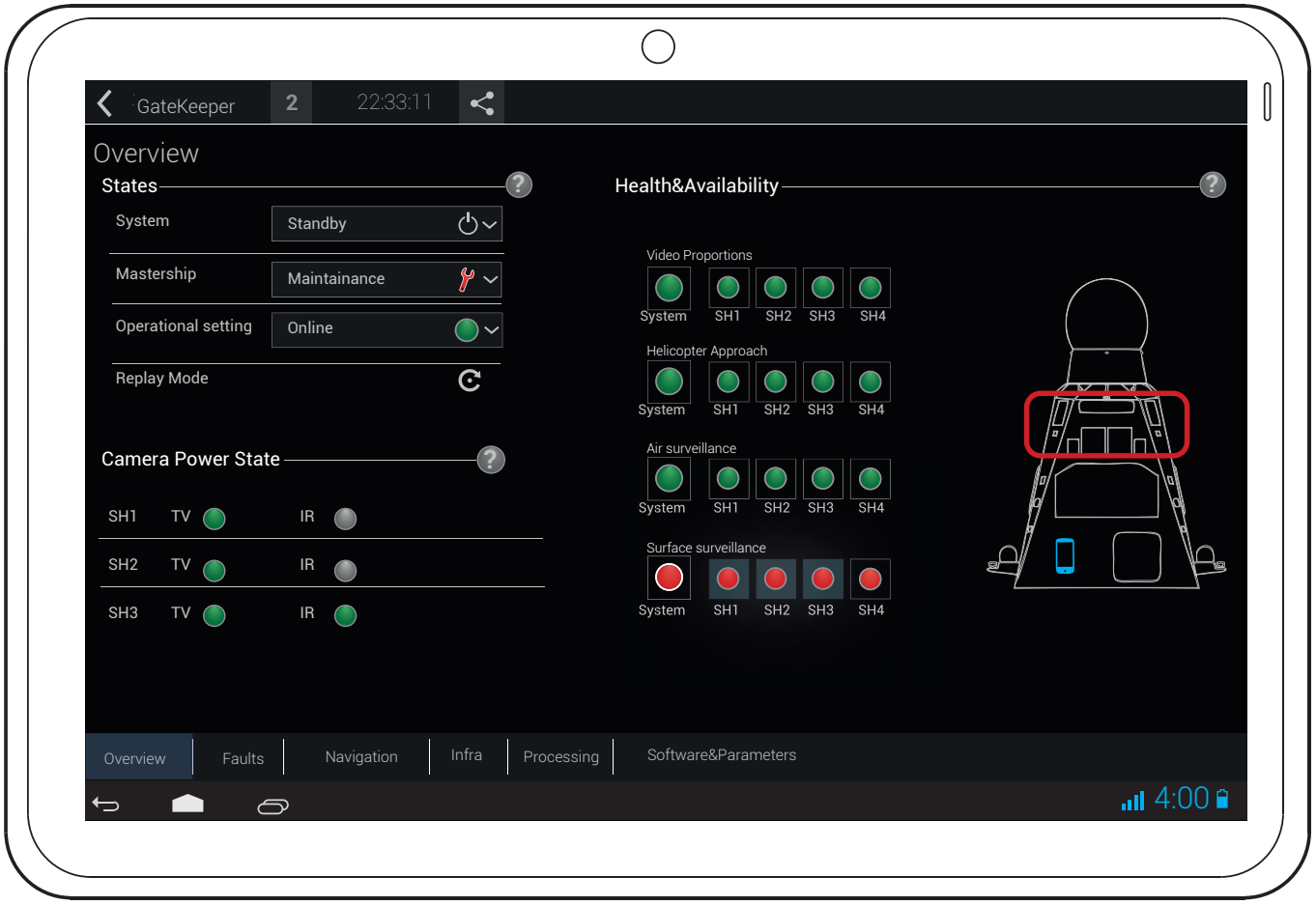
GateKeeper
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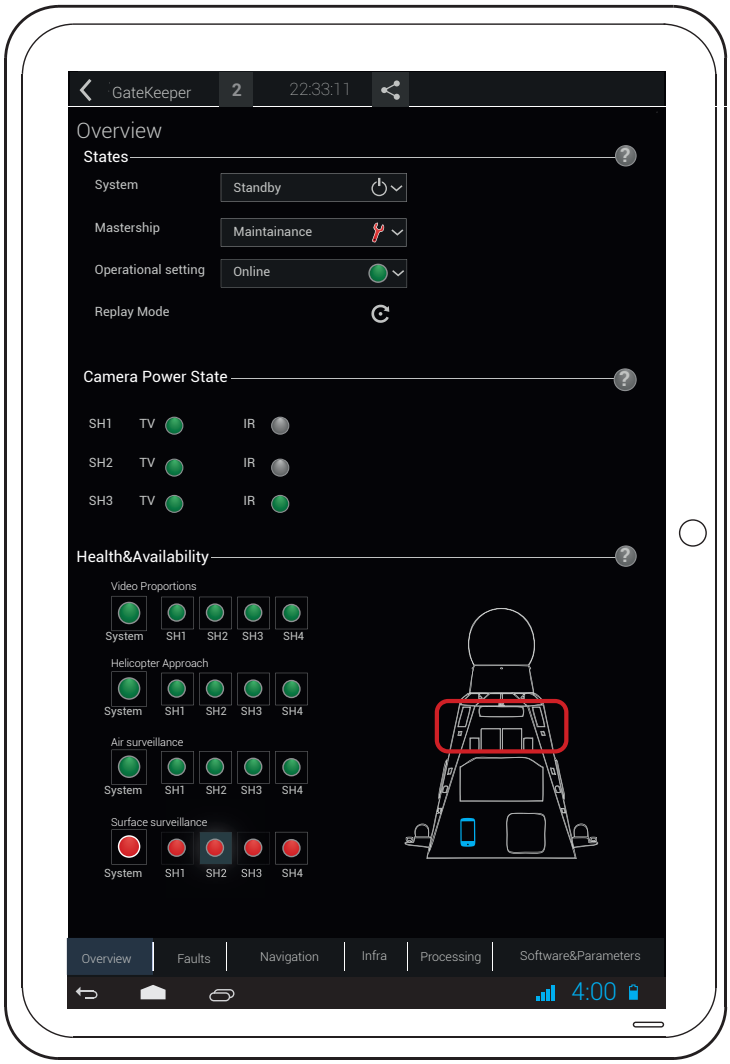
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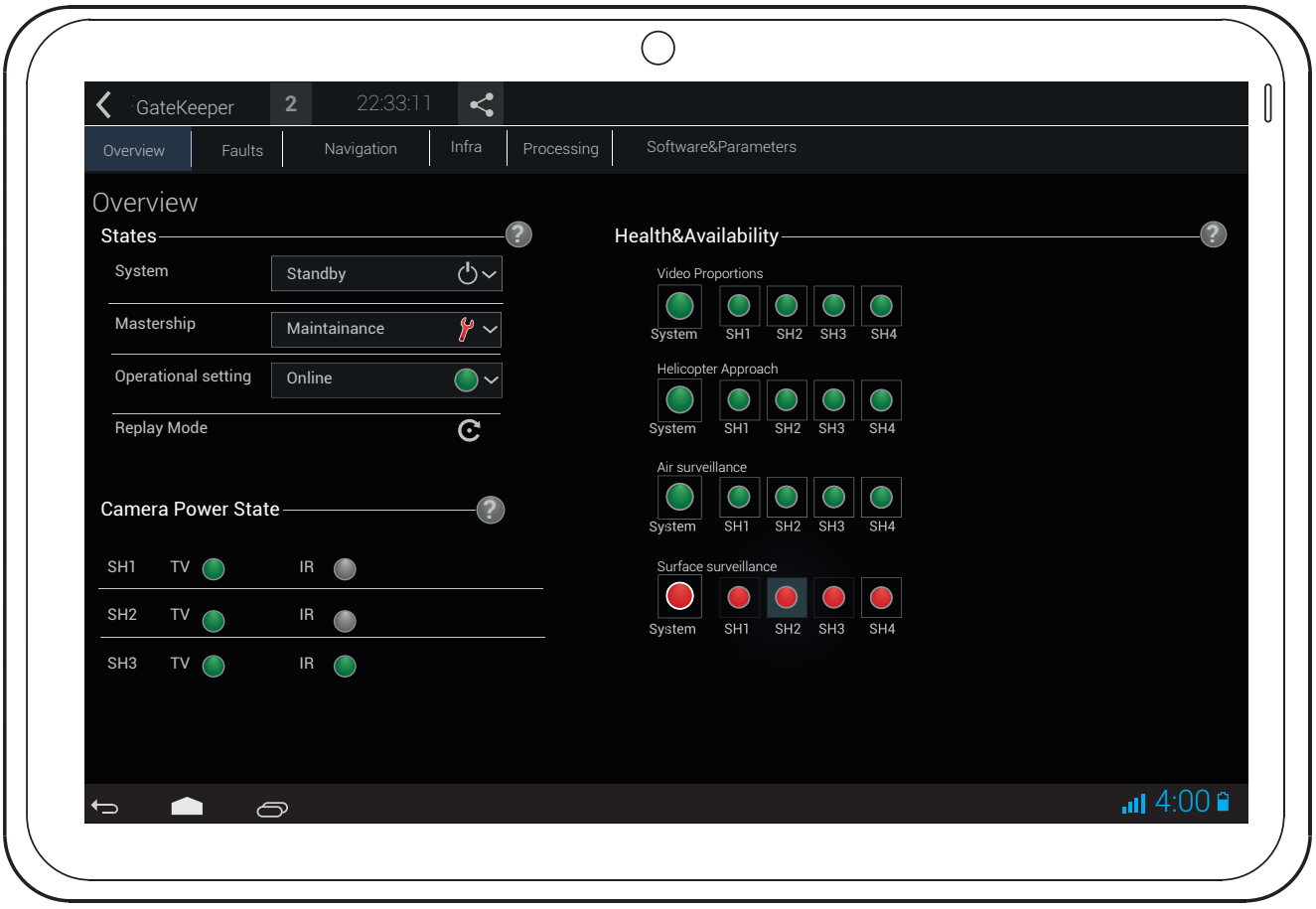
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System SH1 SH2 SH3 SH4
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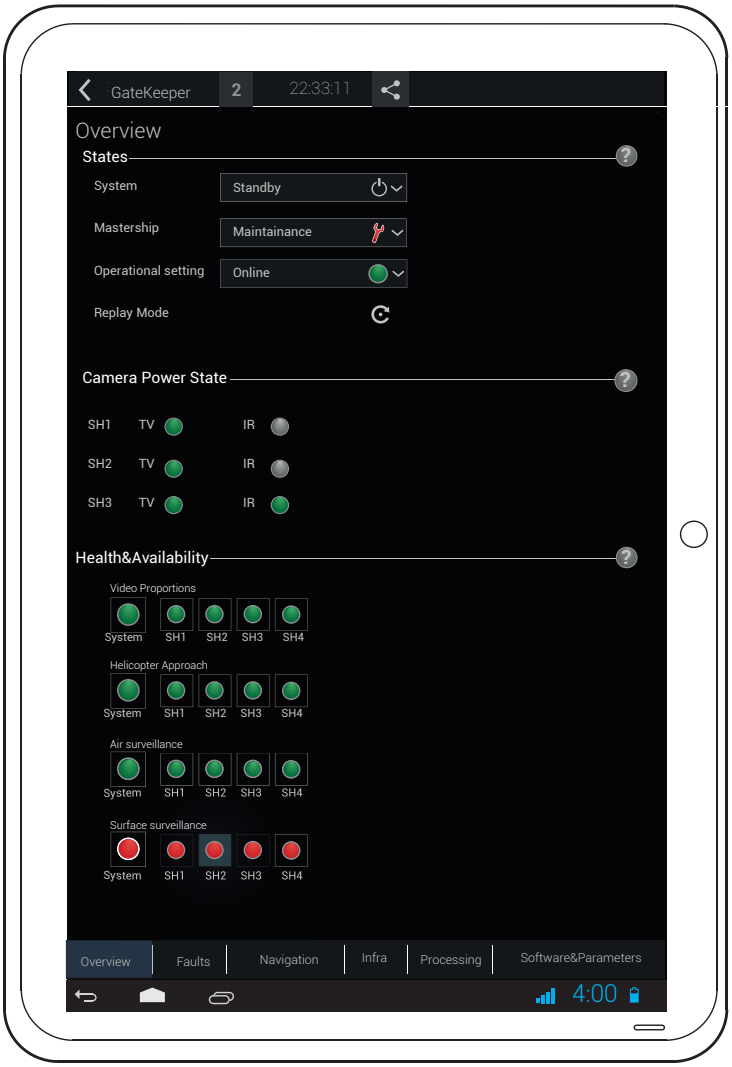
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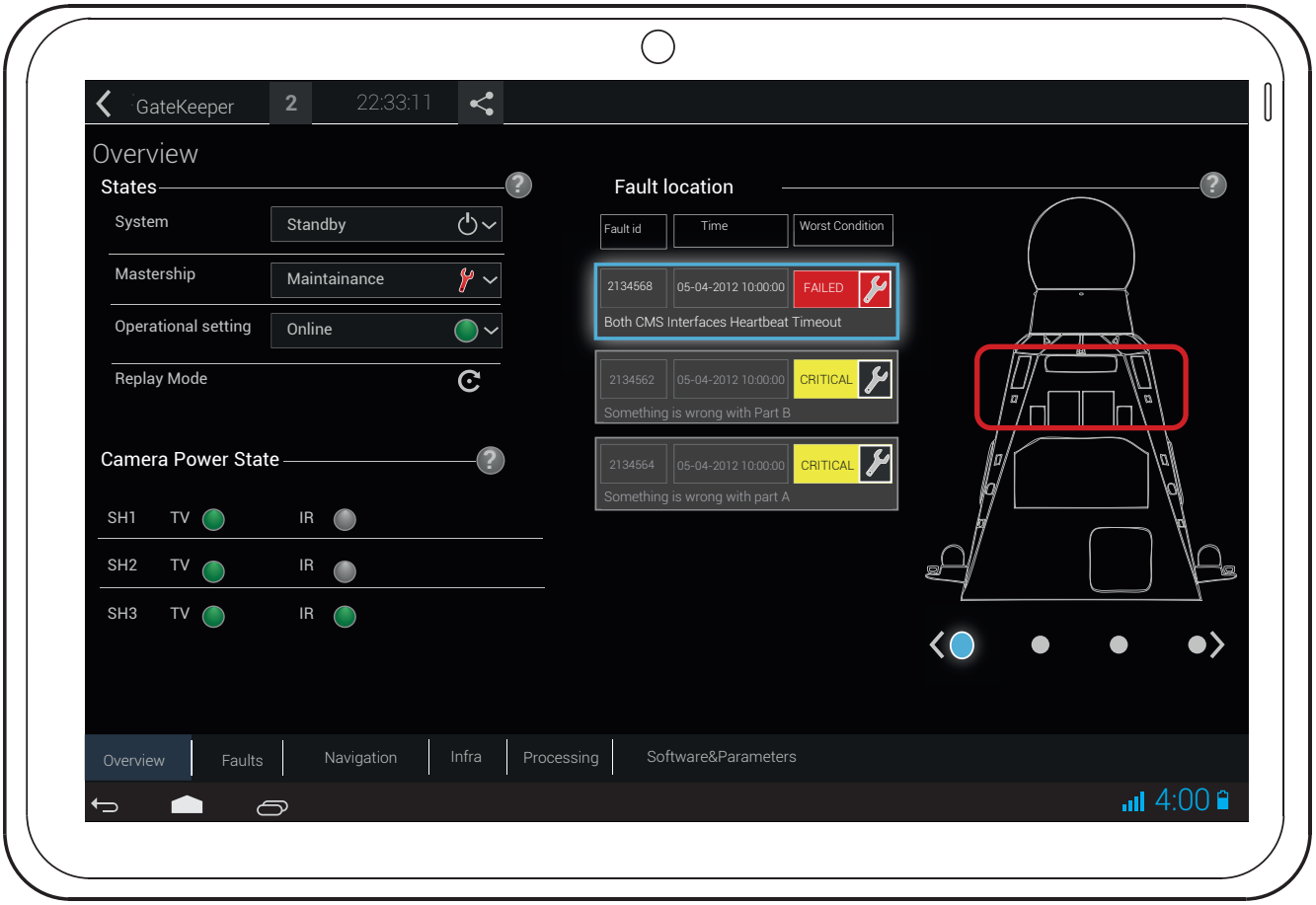
GateKeeper
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Operational setting
Online
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Camera Power State
SH1 TV IR
SH2 TV IR
SH3 TV IR
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Fault id
Time
Worst Condition
2134568 05-04-2012 10:00:00 FAILED
Both CMS Interfaces Heartbeat Timeout
2134562 05-04-2012 10:00:00 CRITICAL
Something is wrong with Part B
2134564 05-04-2012 10:00:00 CRITICAL
Something is wrong with part A
Overview
Faults
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Infra
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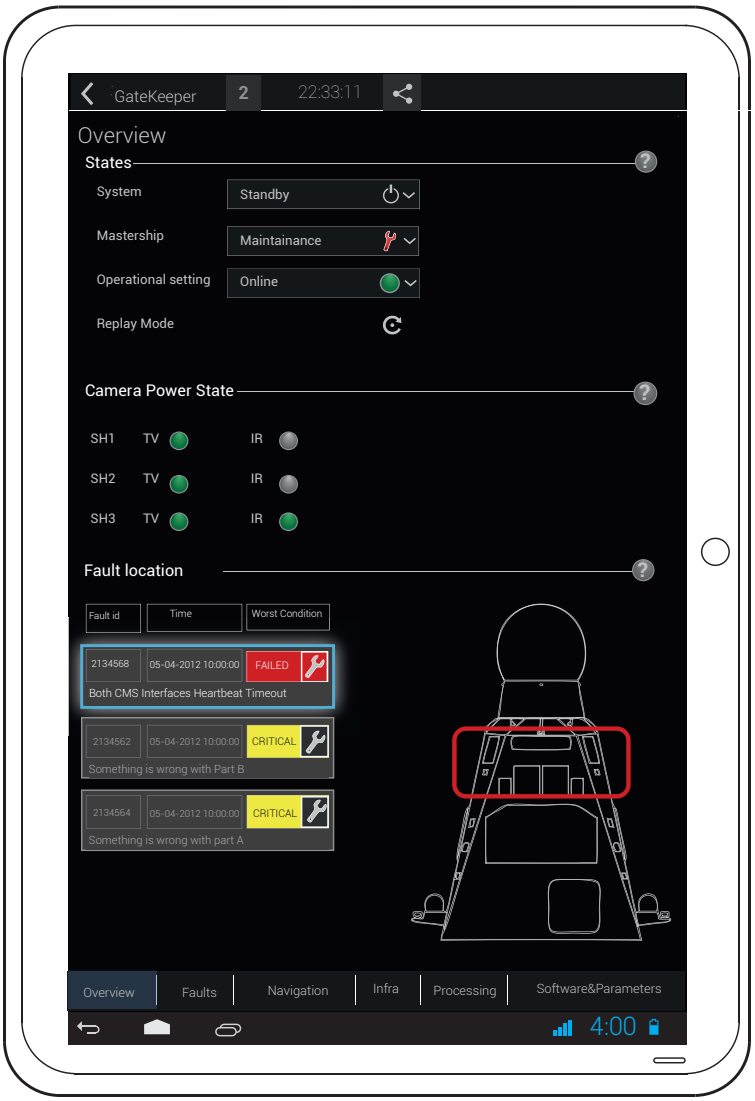
Software&Parameters
4:00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2
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SH1 TV IR
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Something is wrong with part A
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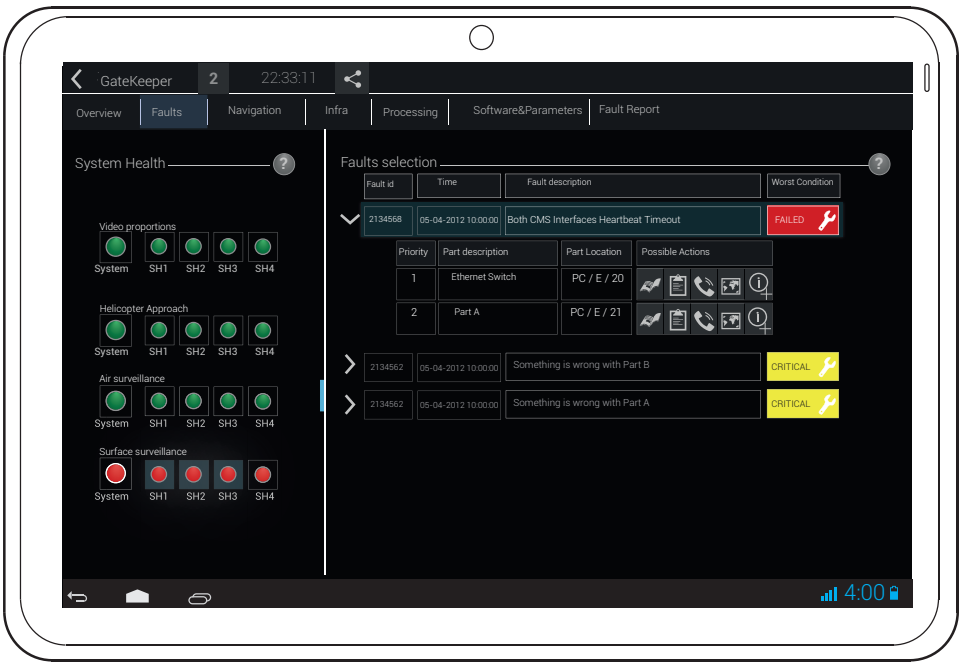
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2
Part A
PC / E / 21
2134562
Something is wrong with Part B
CRITICAL
Something is wrong with Part A
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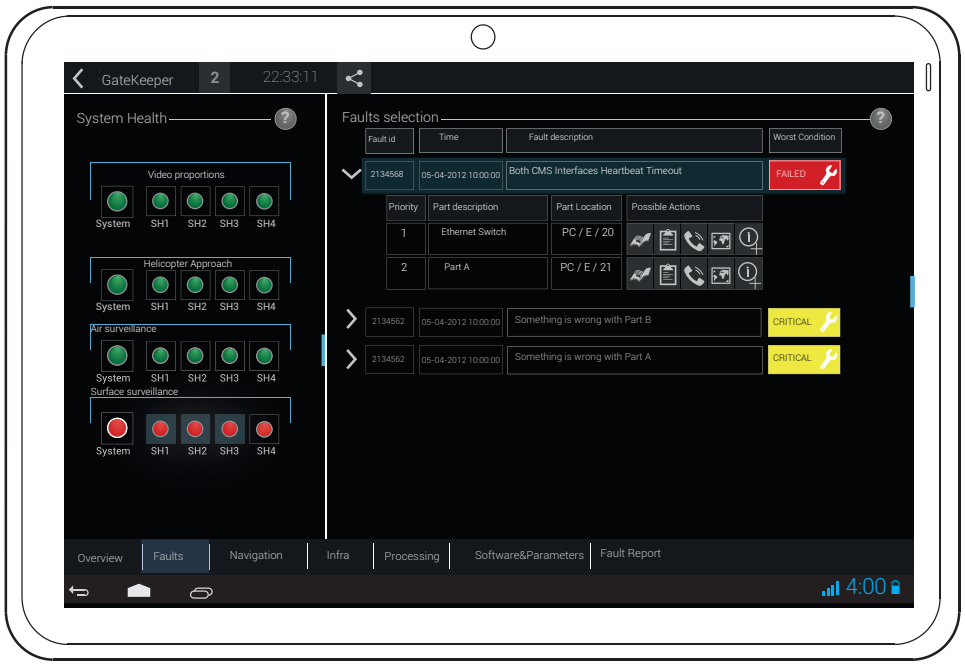
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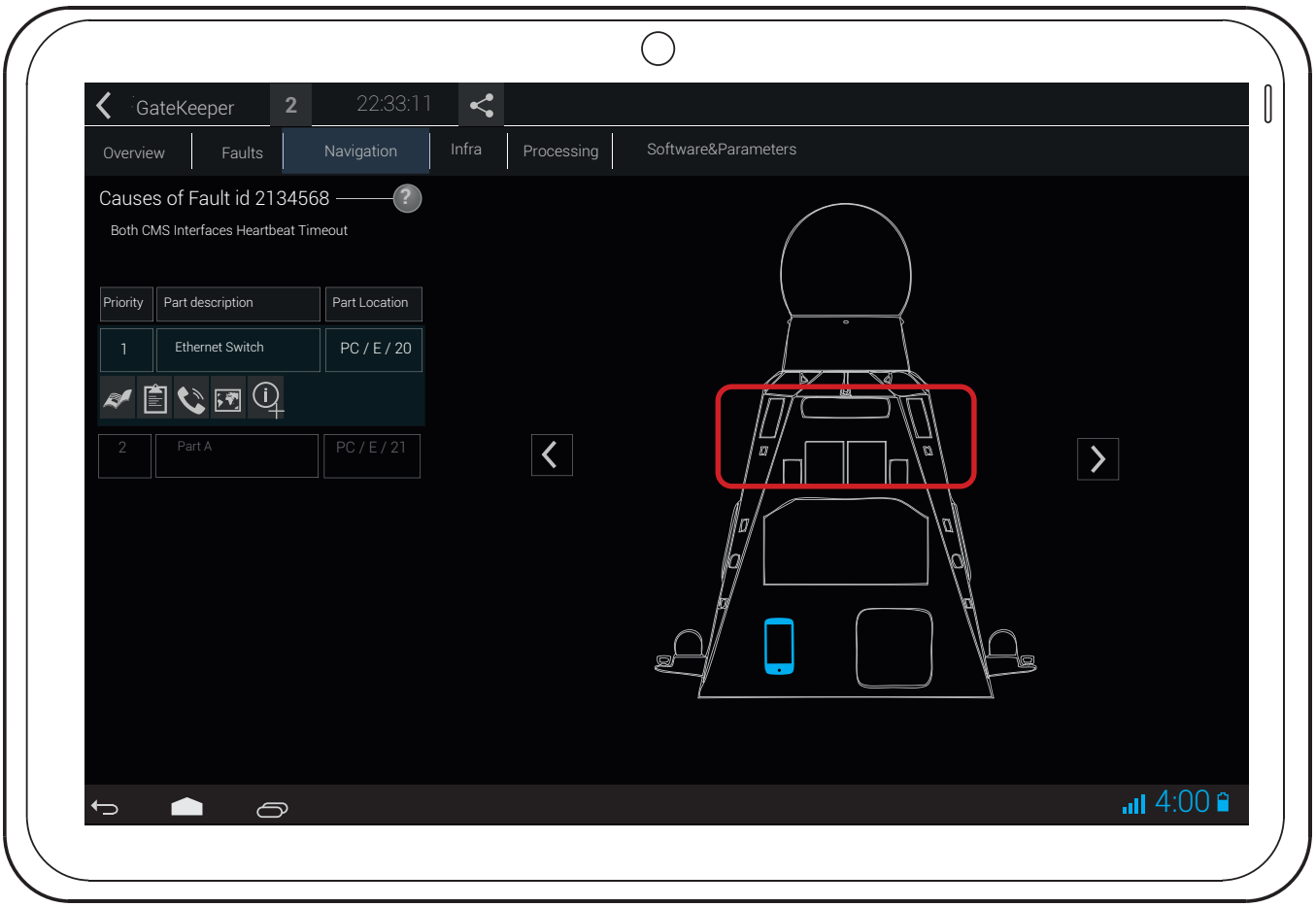
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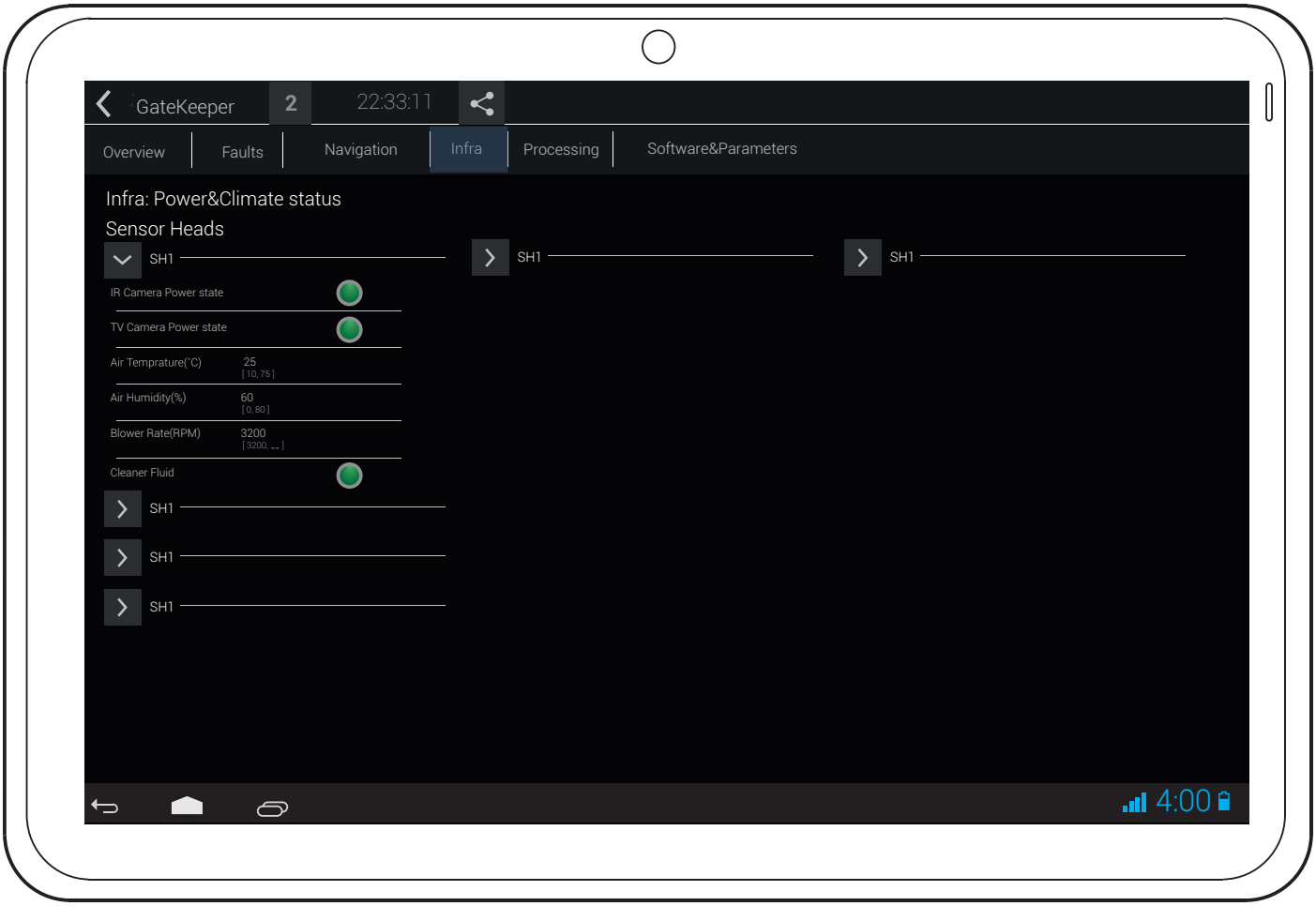
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Infra: Power&Climate status
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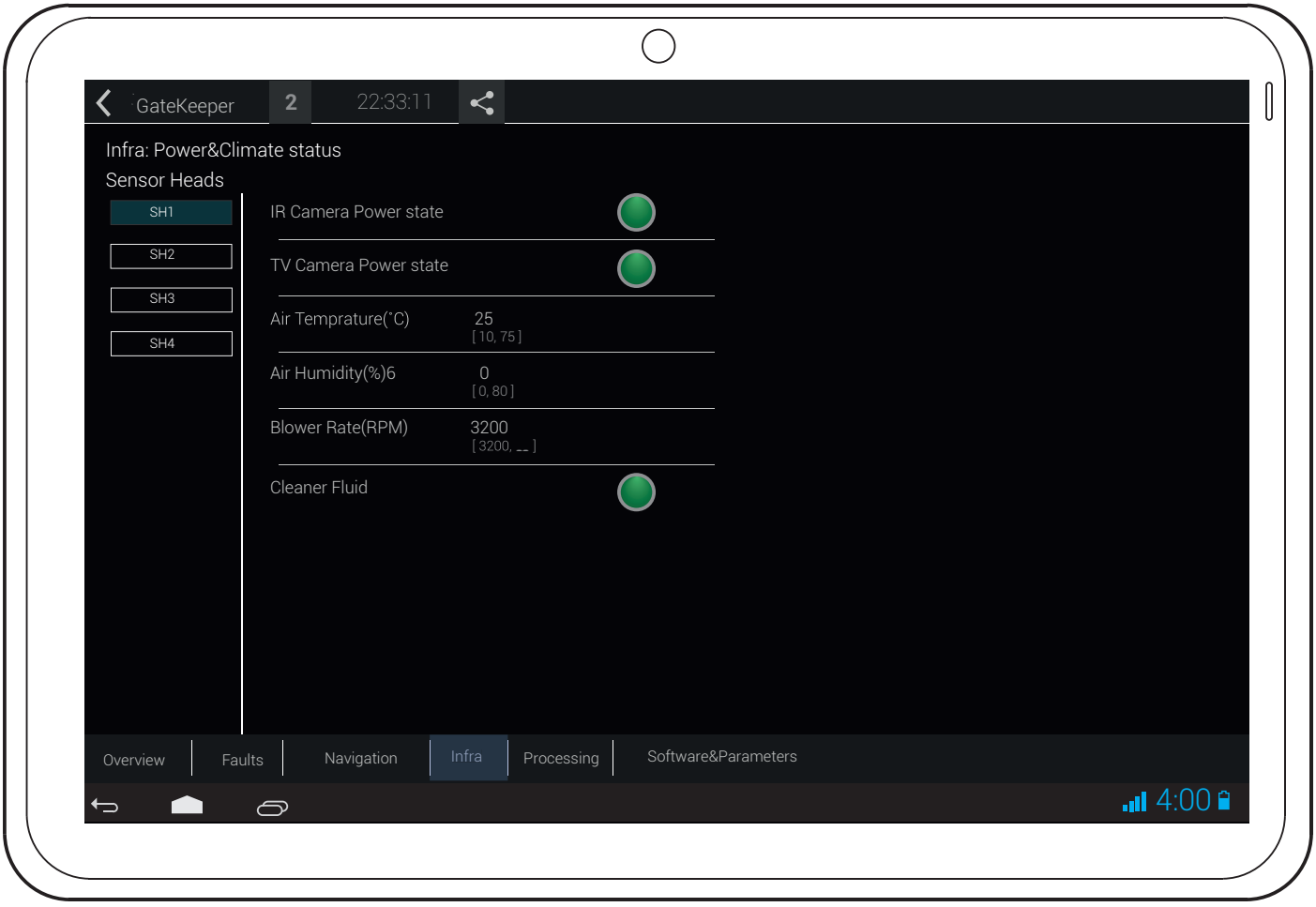
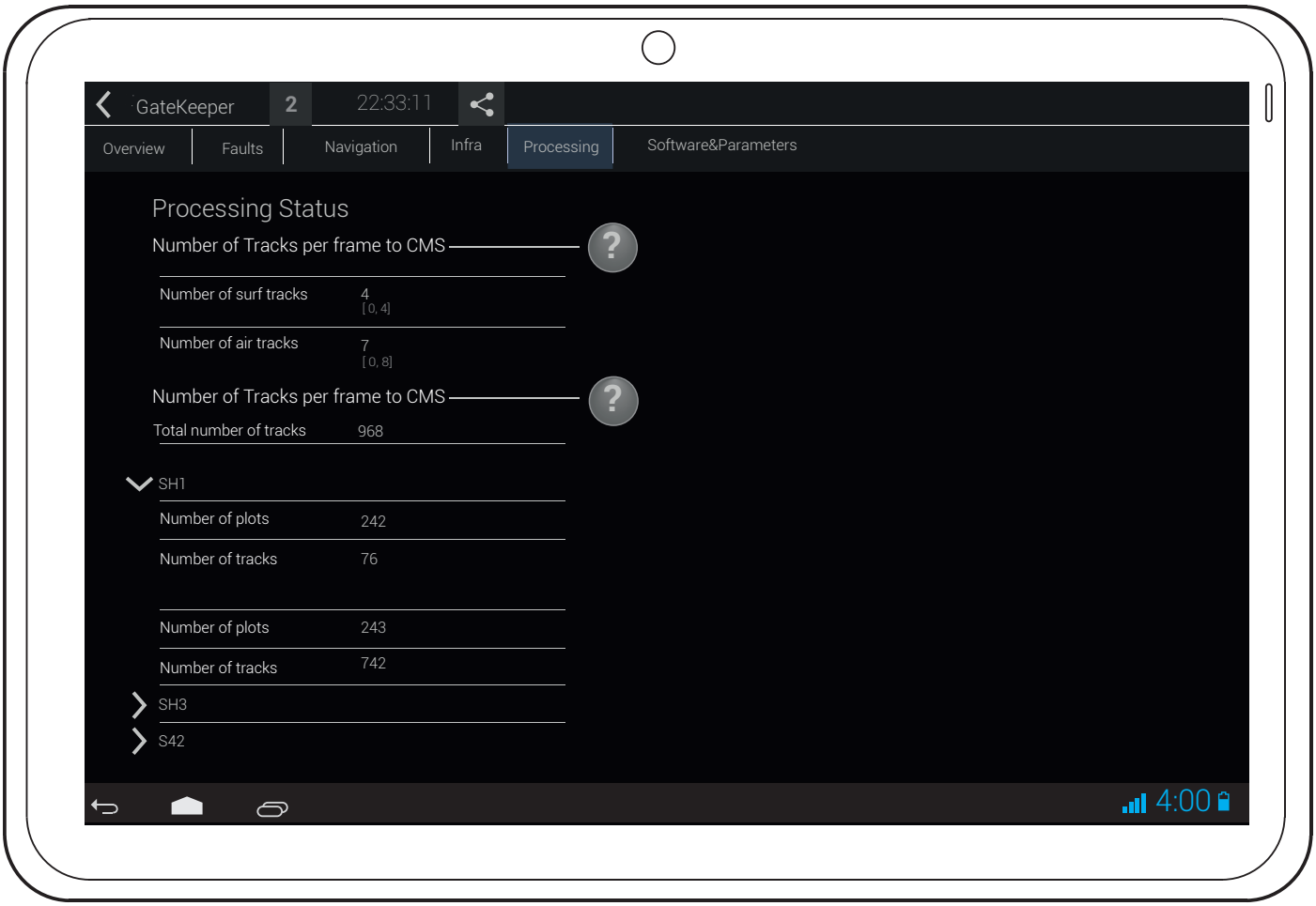
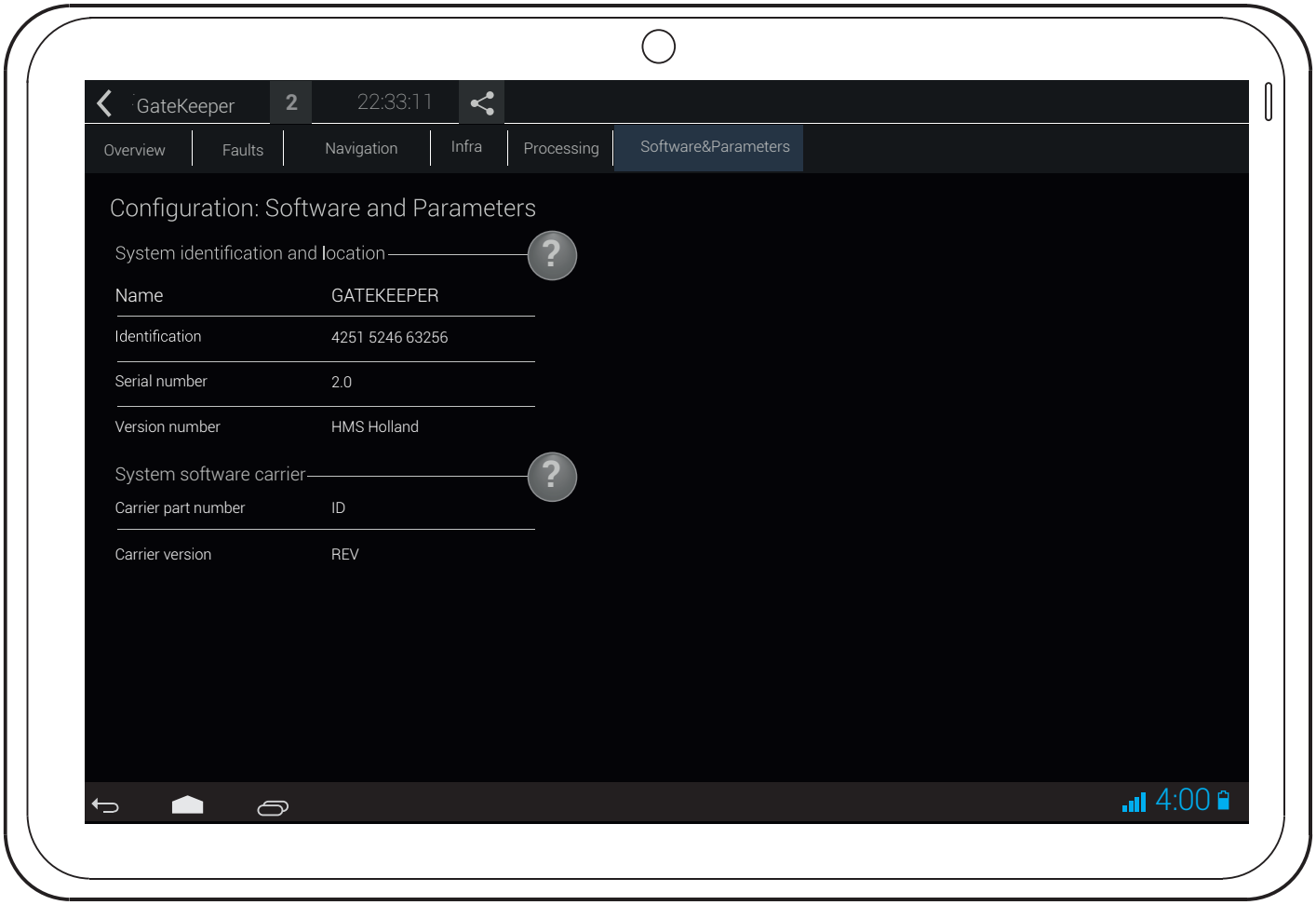
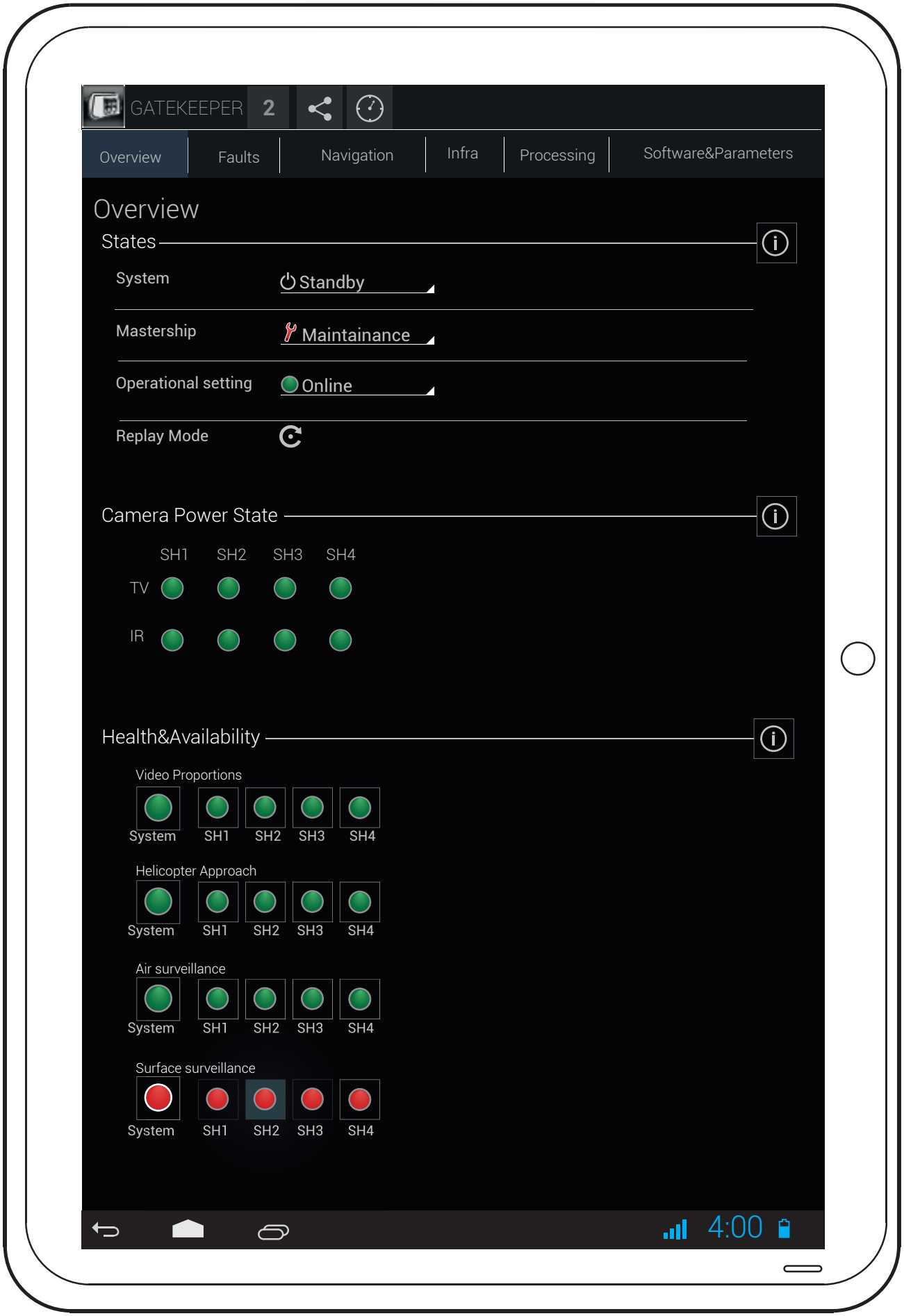
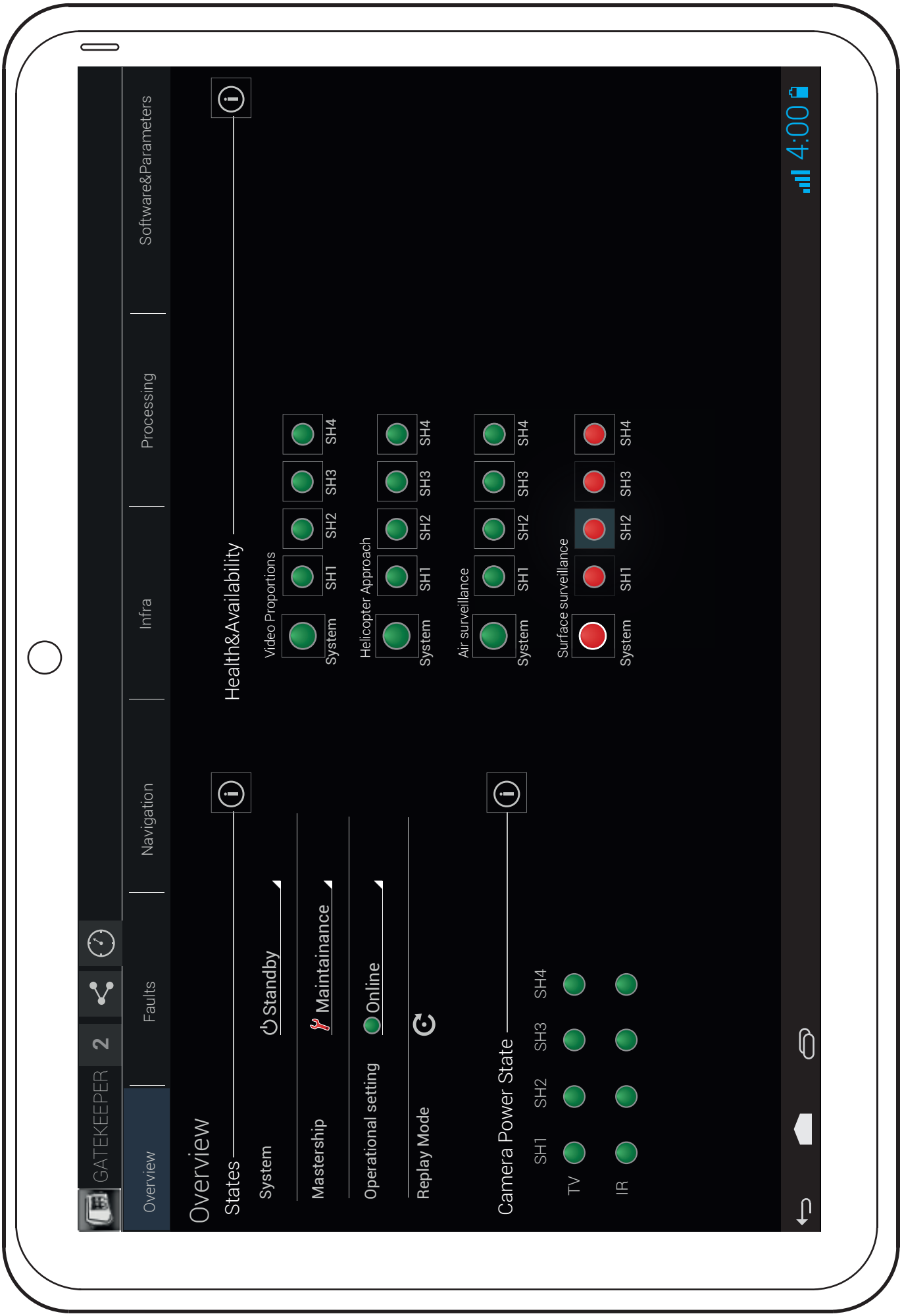
SH1
SH1
SH1
IR Camera Power state
TV Camera Power state
Air Temprature(˚C)
25
[10, 75]
Air Humidity(%)
60
[0, 80]
Blower Rate(RPM)
3200
[3200, --]
Cleaner Fluid
SH1
SH1
SH1
4:00

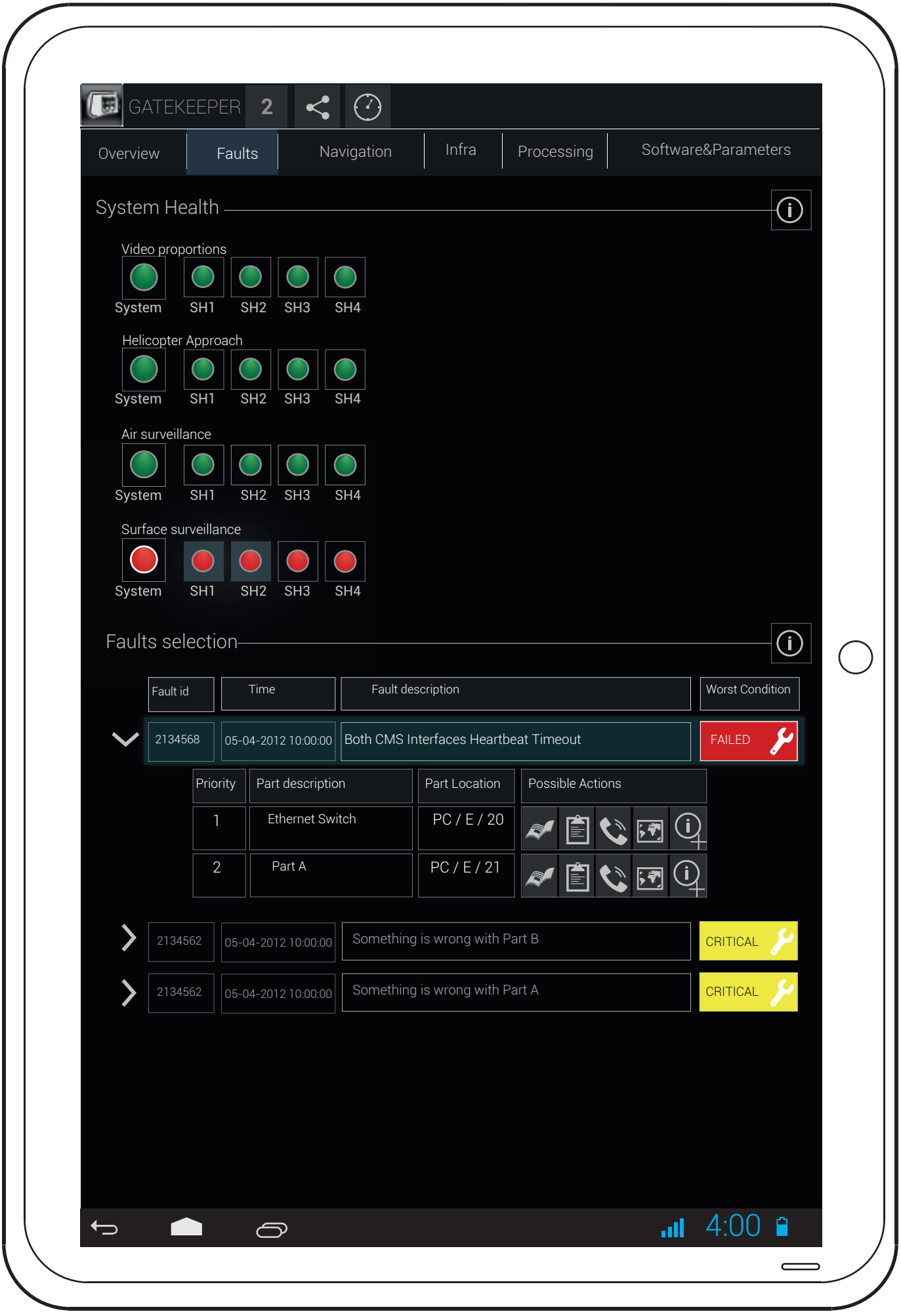

GateKeeper
2
22:33:11
Infra: Power&Climate status
Sensor Heads
SH1
SH2
SH3
SH4
IR Camera Power state
TV Camera Power state
Air Temprature(˚C)
25
[10, 75]
Air Humidity(%)6
0
[0, 80]
Blower Rate(RPM)
3200
[3200, --]
Cleaner Fluid
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
4:00

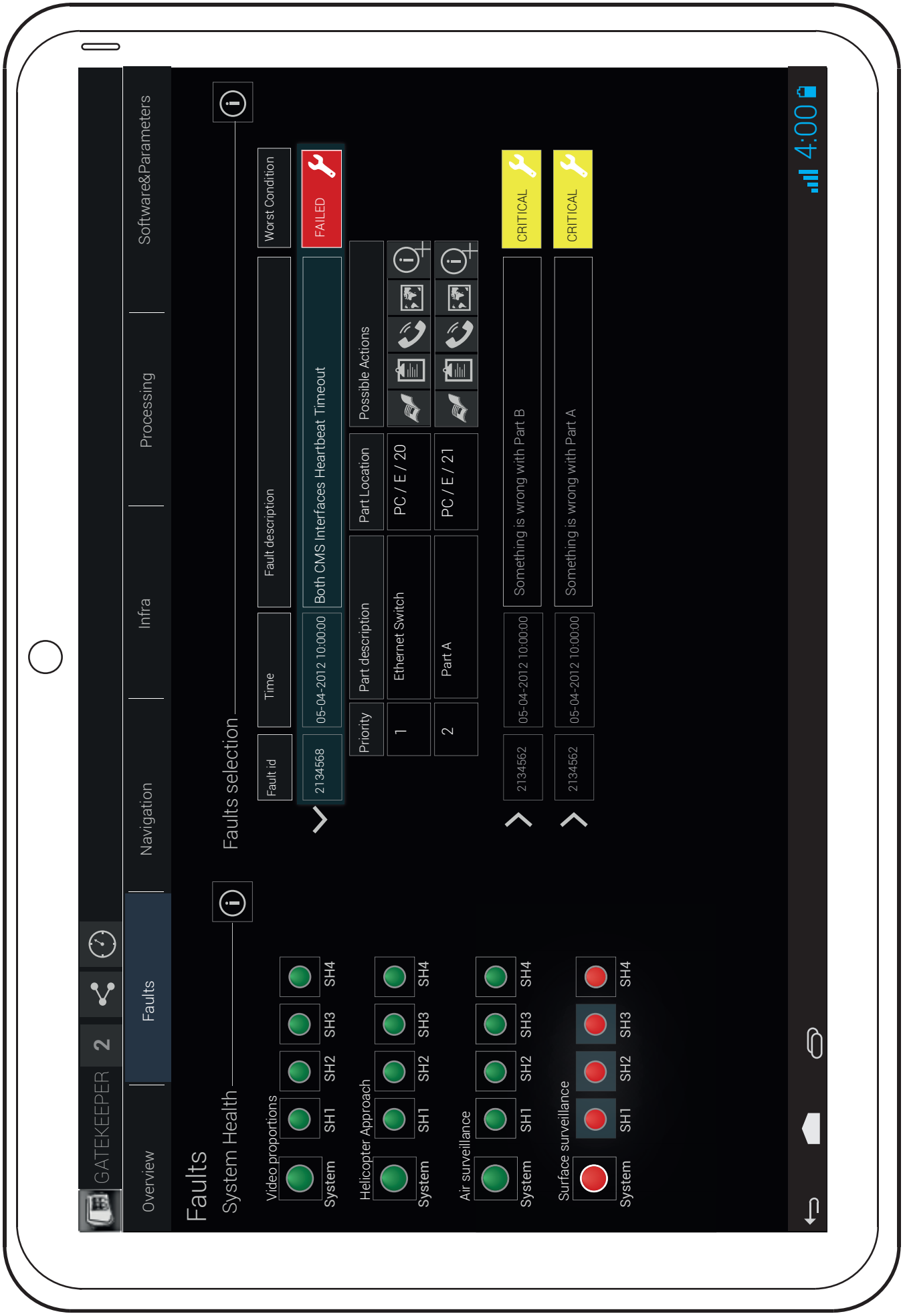

GateKeeper
2
22:33:11
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
Processing Status
Number of Tracks per frame to CMS
?
Number of surf tracks
4
[0, 4]
Number of air tracks
7
[0, 8]
Number of Tracks per frame to CMS
?
Total number of tracks
968
SH1
Number of plots
242
Number of tracks
76
Number of plots
243
Number of tracks
742
SH3
S42
4:00

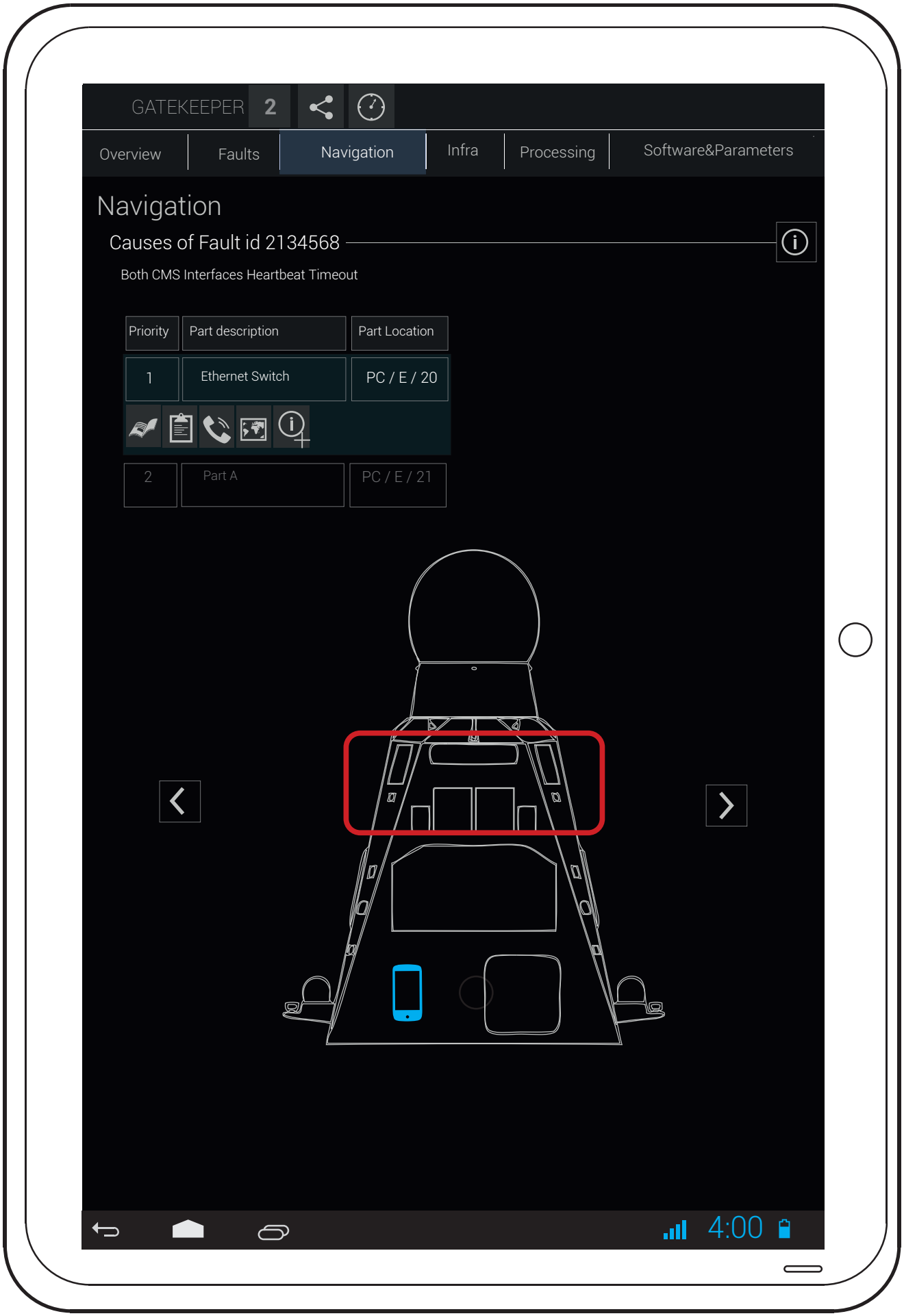

GateKeeper
2
22:33:11
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
Configuration: Software and Parameters
System identification and location
Name
GATEKEEPER
Identification
4251 5246 63256
Serial number
2.0
Version number
HMS Holland
System software carrier
Carrier part number
ID
Carrier version
REV
4:00

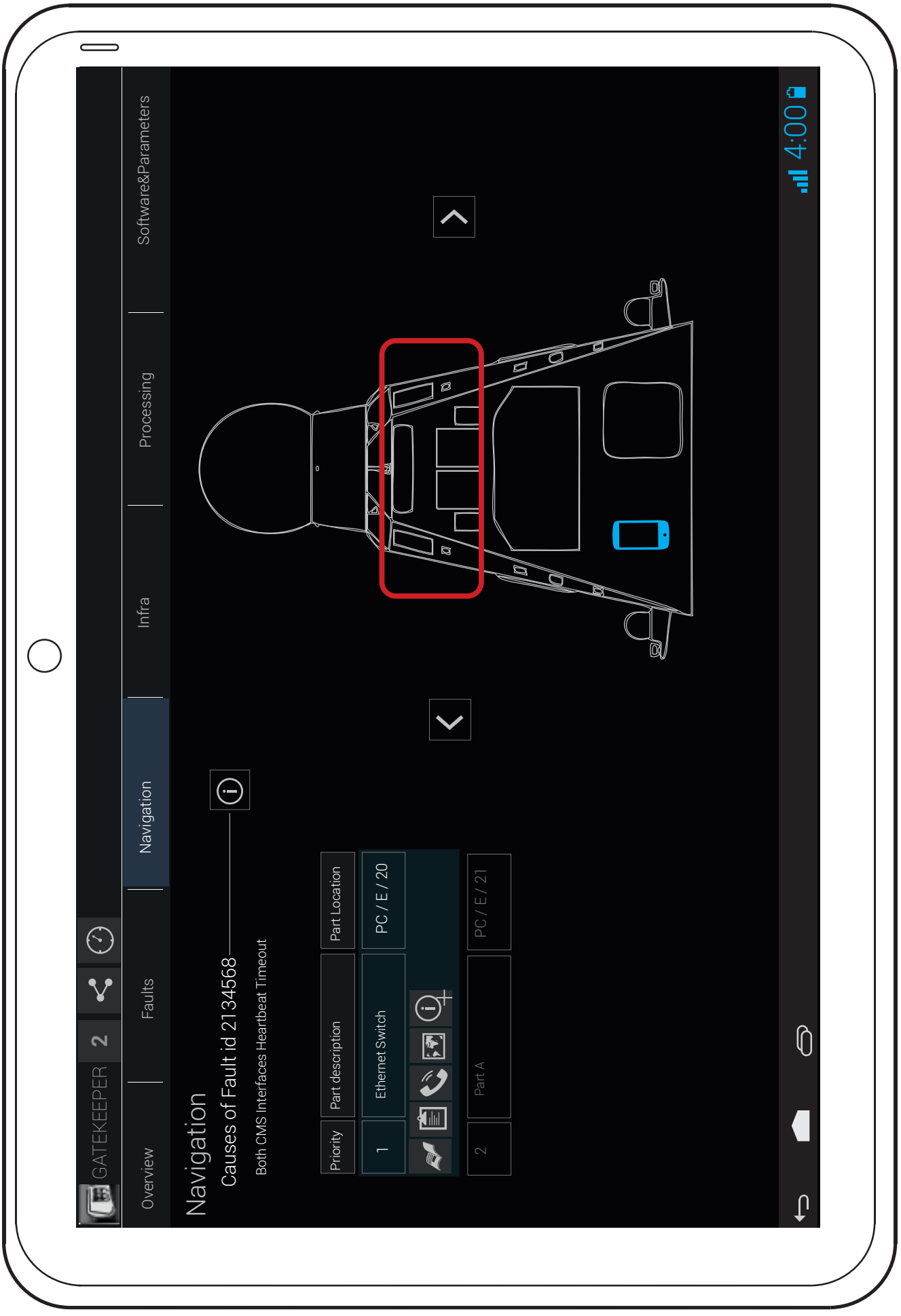

GATEKEEPER 2
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
Overview
States
System
Standby
Mastership
Maintainance
Operational setting
Online
Replay Mode
Camera Power State
SH1 SH2 SH3 SH4
TV
IR
Health&Availability
Video Proportions
System SH1 SH2 SH3 SH4
Helicopter Approach
System SH1 SH2 SH3 SH4
Air surveillance
System SH1 SH2 SH3 SH4
Surface surveillance
System SH1 SH2 SH3 SH4
4:00

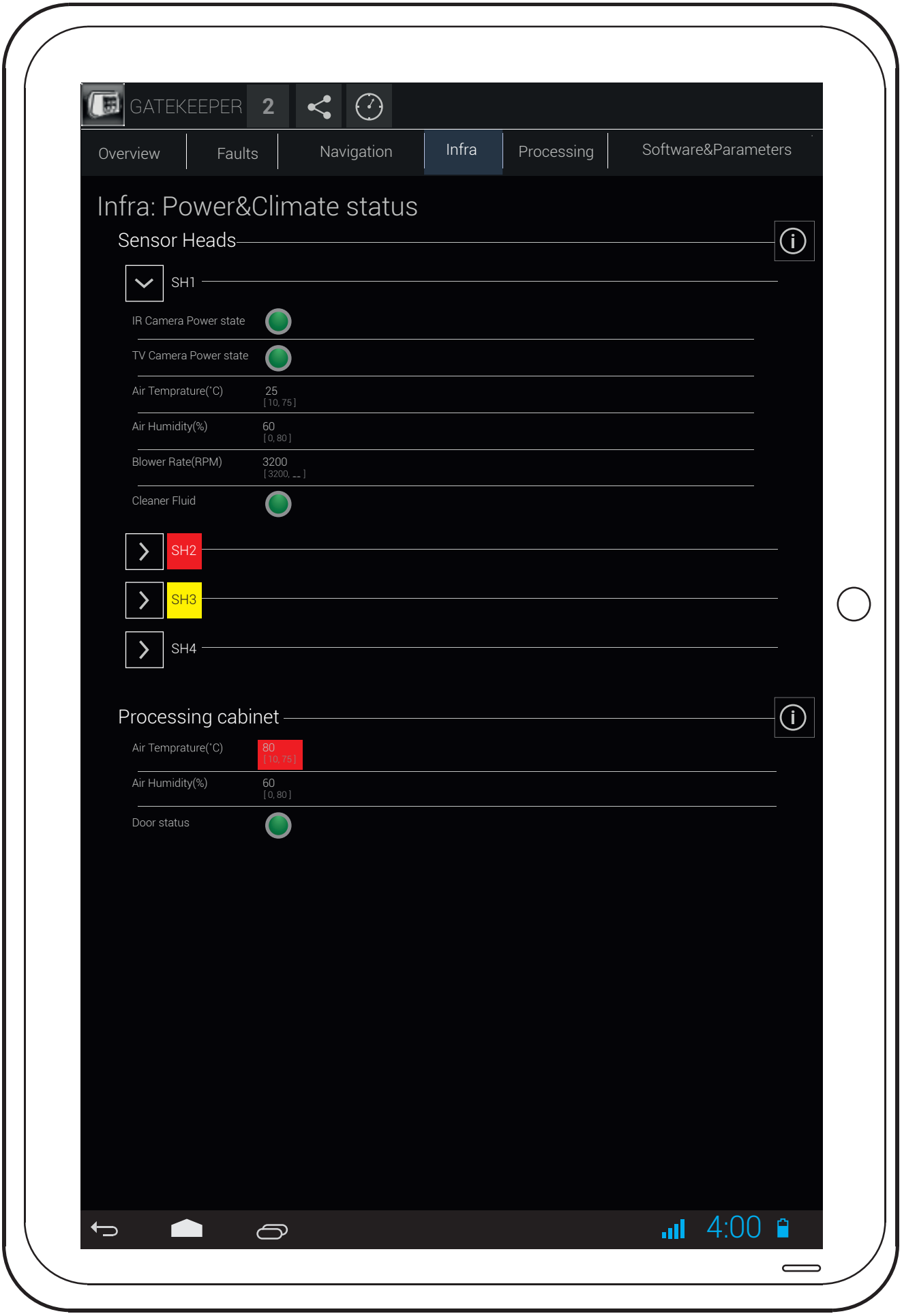

GATEKEEPER
2
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
Overview
States
System
Standby
Mastership
Maintainance
Operational setting
Online
Replay Mode
Camera Power State
SH1
SH2
SH3
SH4
TV
IR
Health&Availability
Video Proportions
Helicopter Approach
Air surveillance
Surface surveillance
System
SH1
SH2
SH3
SH4
4:00

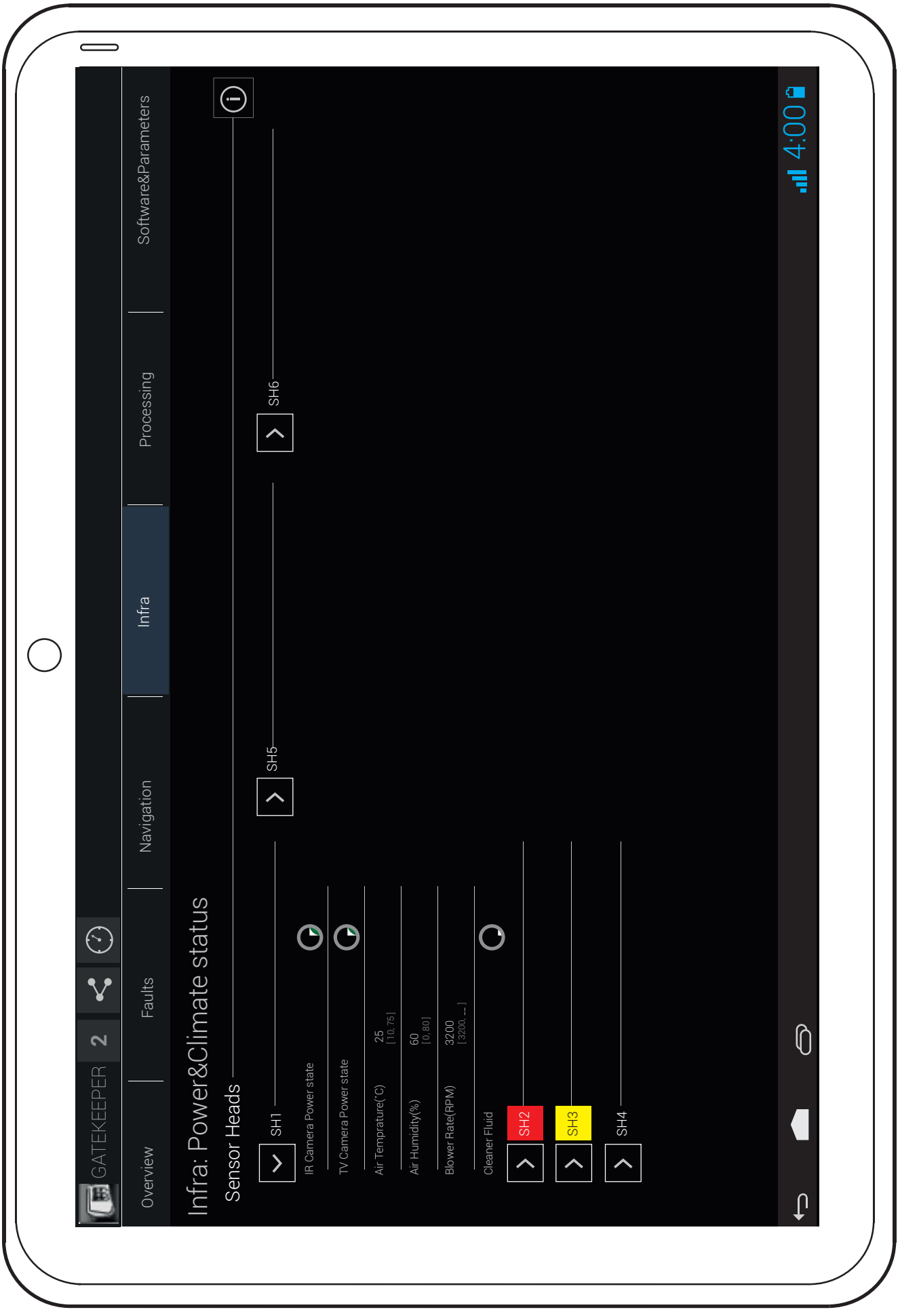

GATEKEEPER 2
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
System Health
Video proportions
System
SH1
SH2
SH3
SH4
Helicopter Approach
System
SH1
SH2
SH3
SH4
Air surveillance
System
SH1
SH2
SH3
SH4
Surface surveillance
System
SH1
SH2
SH3
SH4
Faults selection
Fault id
Time
Fault description
Worst Condition
2134568
05-04-2012 10:00:00
Both CMS Interfaces Heartbeat Timeout
FAILED
Priority
Part description
Part Location
Possible Actions
1
Ethernet Switch
PC / E / 20
2
Part A
PC / E / 21
2134562
05-04-2012 10:00:00
Something is wrong with Part B
CRITICAL
2134562
05-04-2012 10:00:00
Something is wrong with Part A
CRITICAL
4:00

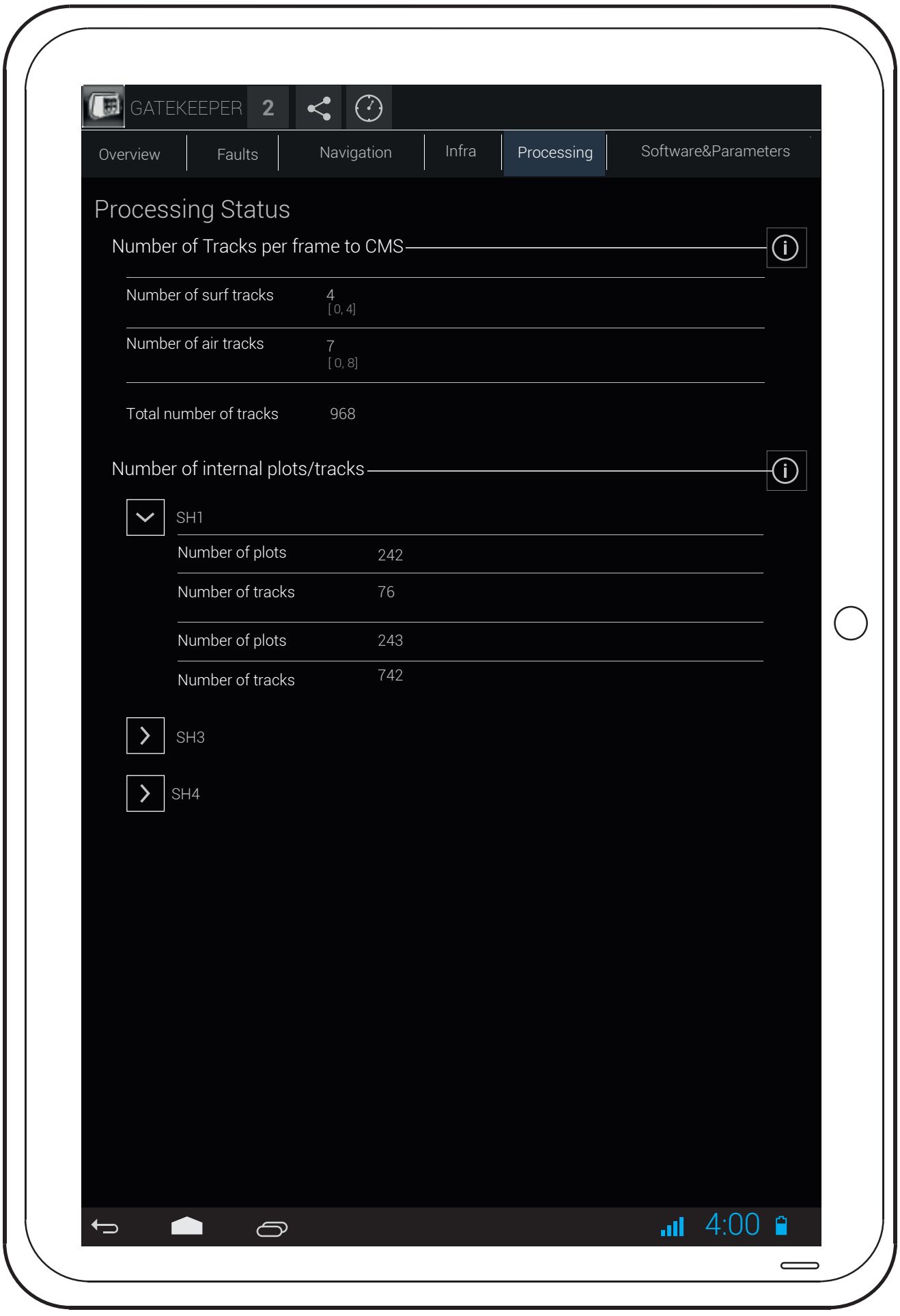

GATEKEEPER
2
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
4:00
Faults
System Health
Video proportions
Helicopter Approach
Air surveillance
Surface surveillance
System
SH1
SH2
SH3
SH4
Faults selection
Fault id
Time
Fault description
Worst Condition
2134568
05-04-2012 10:00:00
Both CMS Interfaces Heartbeat Timeout
FAILED
Priority
Part description
Part Location
Possible Actions
1
Ethernet Switch
PC / E / 20
2
Part A
PC / E / 21
2134562
05-04-2012 10:00:00
Something is wrong with Part B
CRITICAL
2134562
05-04-2012 10:00:00
Something is wrong with Part A
CRITICAL

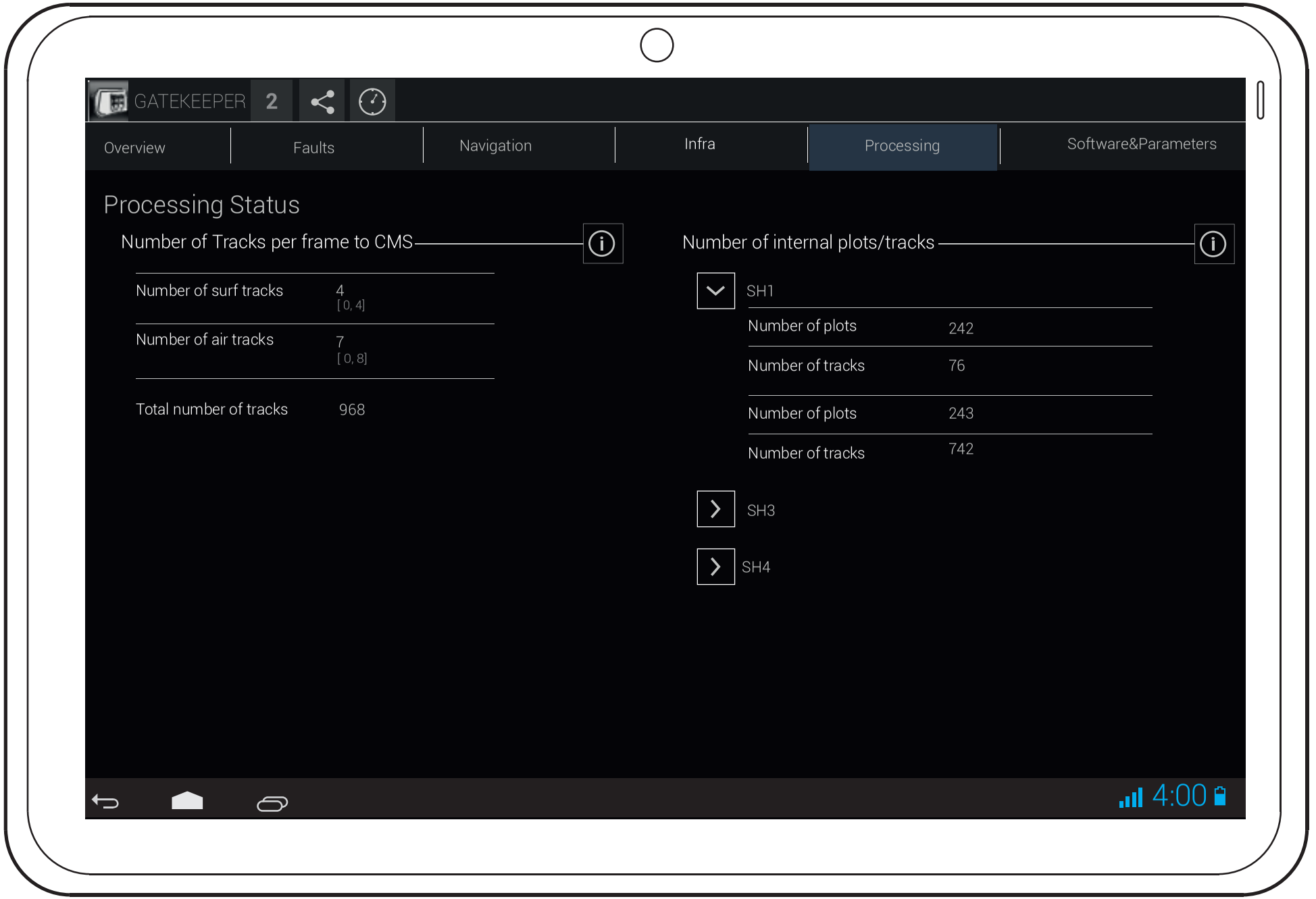

GATEKEEPER 2
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
Navigation
Causes of Fault id 2134568
Both CMS Interfaces Heartbeat Timeout
Priority
Part description
Part Location
1
Ethernet Switch
PC / E / 20
2
Part A
PC / E / 21
4:00


GATEKEEPER 2
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
4:00
Navigation
Causes of Fault id 2134568
Both CMS Interfaces Heartbeat Timeout
Priority
Part description
Part Location
1
Ethernet Switch
PC / E / 20
2
Part A
PC / E / 21


GATEKEEPER 2
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
Infra: Power&Climate status
Sensor Heads
SH1
IR Camera Power state
TV Camera Power state
Air Temprature(˚C) 25 [10, 75]
Air Humidity(%) 60 [0, 80]
Blower Rate(RPM) 3200 [3200, --]
Cleaner Fluid
SH2
SH3
SH4
Processing cabinet
Air Temprature(˚C) 80 [10, 75]
Air Humidity(%) 60 [0, 80]
Door status
4:00


GATEKEEPER 2
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
4:00
Infra: Power&Climate status
Sensor Heads
SH1
IR Camera Power state
TV Camera Power state
Air Temprature(°C) 25 [10..75]
Air Humidity(%) 60 [0..80]
Blower Rate(RPM) 3200 [3200...]
Cleaner Fluid
SH2
SH3
SH4
SH5
SH6


GATEKEEPER 2
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
Processing Status
Number of Tracks per frame to CMS
Number of surf tracks
4
[0, 4]
Number of air tracks
7
[0, 8]
Total number of tracks
968
Number of internal plots/tracks
SH1
Number of plots
242
Number of tracks
76
Number of plots
243
Number of tracks
742
SH3
SH4
4:00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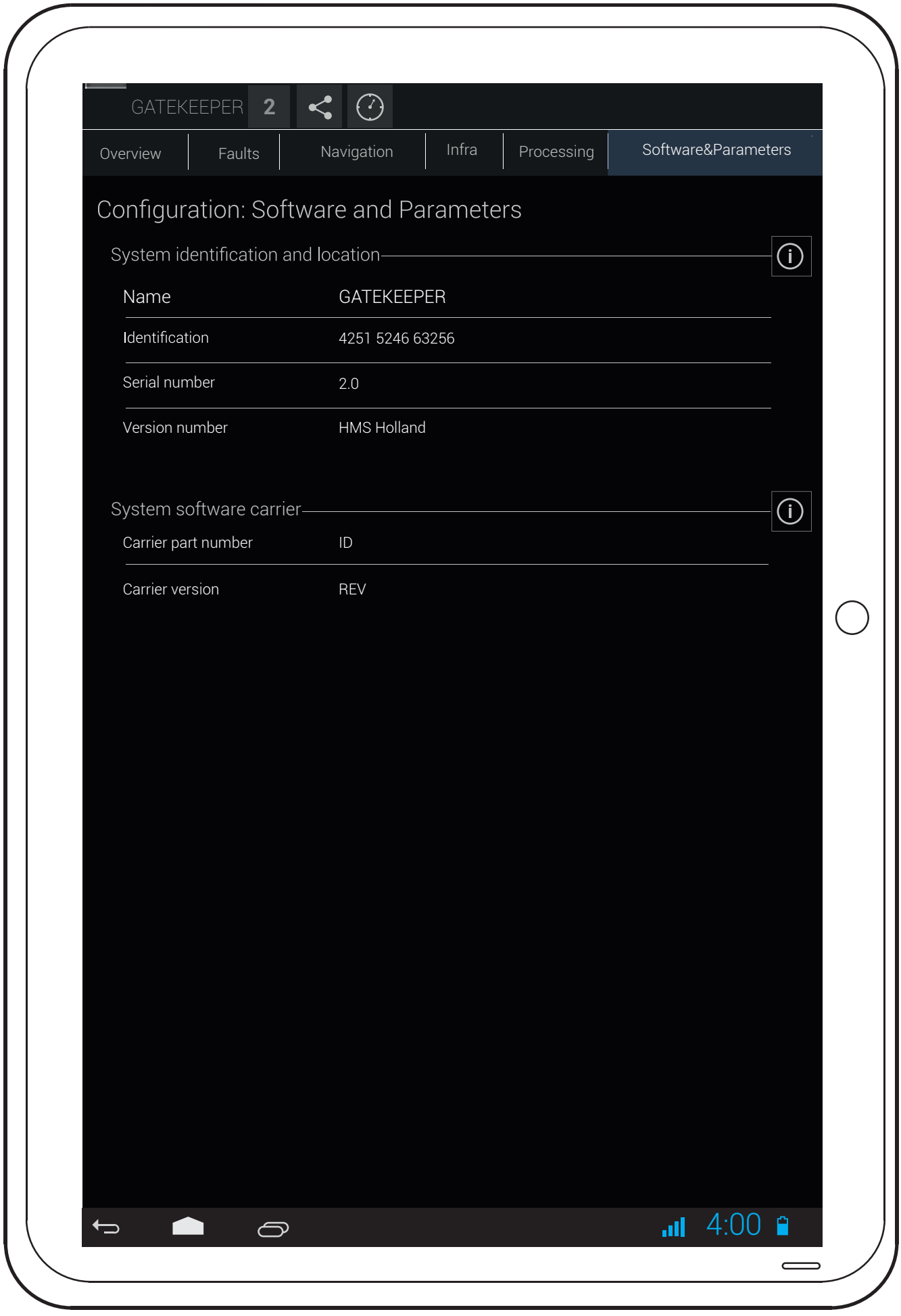
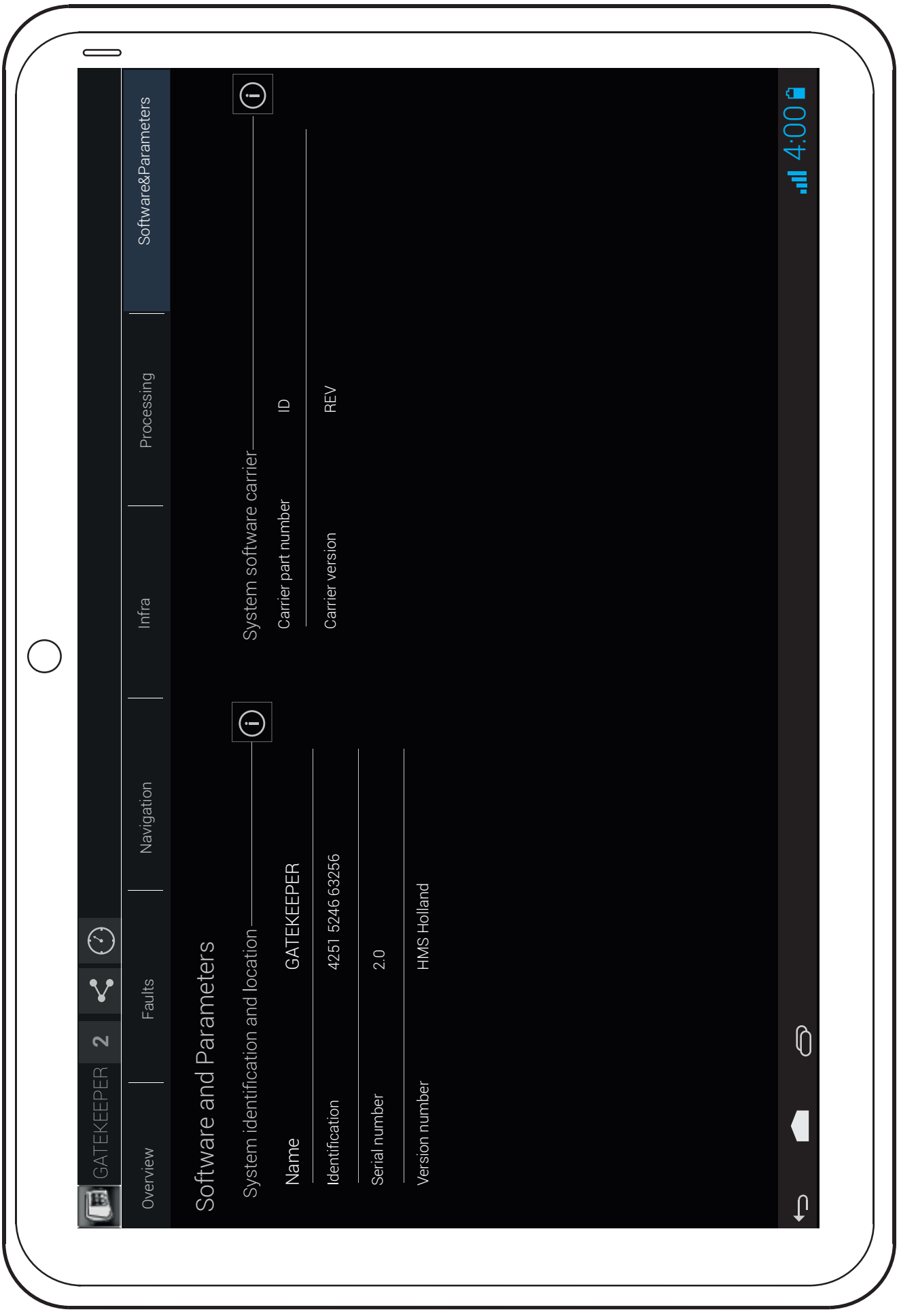
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
Processing Status
Number of Tracks per frame to CMS
Number of surf tracks 4 [0, 4]
Number of air tracks 7 [0, 8]
Total number of tracks 968
Number of internal plots/tracks
SH1
Number of plots 242
Number of tracks 76
Number of plots 243
Number of tracks 742
SH3
SH4
4:00


GATEKEEPER 2
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
Configuration: Software and Parameters
System identification and location
Name
GATEKEEPER
Identification
4251 5246 63256
Serial number
2.0
Version number
HMS Holland
System software carrier
Carrier part number
ID
Carrier version
REV
4:00


GATEKEEPER 2
Overview
Faults
Navigation
Infra
Processing
Software&Parameters
4:00
Software and Parameters
System identification and location
Name
GATEKEEPER
Identification
4251 5246 63256
Serial number
2.0
Version number
HMS Holland
System software carrier
Carrier part number
ID
Carrier version
REV

Interface analysis

Alle informatie die de Maintainer invult/aanpast moet via een netwerkverbinding(draadloos/kabel) worden opgeslagen/gecommuniceerd met het fysieke system. Ook alle beschikbare informatie moet via dezelfde netwerk verbinding worden aangeleverd aan de GUI.

AP=Aanpasbaar voor de Maintainer

Configuration: software and parameters scherm.

a)Wat is de bedoeling van het scherm?

In dit scherm kunnen verschillende system identification en location variabelen worden aangepast. Verder kunnen de parameters van de gehele Configuratie sectie worden opgeslagen/teruggehaald op/van schijf.

b)Wat voor elementen staan op het scherm?

Het scherm is under verdeeld in 3 sub secties: System identification and location, system software carrier en backup and restore parameters. In de maintainance mode kunnen er in het system identification and location subscherm de tekstvelden: Name, Serial Identification en Location van het worden aangepast. Deze tekst velden hebben ook allemaal een process indicator ernaast. Verder staat onder het system software carrier een tweetal knoppen waarmee de bovenstaande instellingen kunnen worden geaccepteerd of verworpen. Ook staan hier nog 2 velden die niet kunnen worden aangepast en alleen dienen ter informatie: Carrier part nr en Carrier version. In het laatste subscherm staan ook een tweetal knoppen waarmee de ingestelde parameters kunnen worden opgeslagen of worden terug gehaald: Backup en Restore. Als je deze knoppen clickt komt er een dialogue scherm voor met daarop de locatie van opslag of terug halen. Deze dialog heeft een standard uiterlijk/functionaliteit.

c)Wat betekenen deze elementen?

APName tekst veld: Naam van het system
APSerial nr tekst veld: Serie nr van het system
NPIdentification tekst veld: Identificatie nr van het systeem
APLocation: Locatie waarop het system is geïnstalleerd
NPCarrier part nr: een 12 cijfer code voor het identificeren van de software carrier.
NPCarrier version: De versie van deze software carrier.
Apply knop: Voor de veranderingen door
Undo Changes knop: Zet de doorgevoerde veranderingen terug
Backup knop: Maak een back-up van de parameters
Restore knop: Terug zetten van de parameters van de vorige back-up.

Configuration: blind area control scherm.

a)Wat is de bedoeling van het scherm?

In dit scherm kun je zogenoemde Blind Spots markers als Maintainer. Deze markering wordt meegenomen in de Interface van CMS. Daardoor laat hij op de gemarkeerde stukken, zoals een stuk antenne dat net voor de camera zit, geen tracks/plots zien. Dit kan de Maintainer voor al de 12 camera's doen bij het instaleren van het systeem. Hij heeft hierbij een aantal tools ter beschiking. Het camera beeld wordt alleen weergegeven als de Maintainer hier een actie voor geeft, geen permanente feed.

b)Wat voor elementen staan op het scherm?

Boven aan staan er 12 knoppen voor de 12 camera's van de Gatekeeper. In deze knoppen staat een procces indicator. Deze indicator laat zien of een bepaalde camera verbinding heeft met de MC. Verder is het grootste gedeelte van het scherm bedekt met de feed van de geselecteerde camera. Links van dit beeld staan een heel aantal tools om de maskering nauwkeuriger te kunnen maken. Deze mask kan dan worden opgeslagen gecanceld met de knoppen onderin van Apply en Undo changes. Ook kan het overnieuw worden begonnen met het huidige procces met de knop Clear mask. Aan deze mask kunnen alleen aanpassingen worden gedaan als de MC in maintainance mode staat.

c)Wat betekenen deze elementen?

Sensor Head i-combobox: Camera selecteren waarvan de je de mask wilt aanpassen. Tevens indicator over verbinding met camera.
Refresh img knop: Feed ophalen van de geselecteerde camera of het beeld verversen.
Draw knop: Teken mode, hiermee kan een mask worden getekend
Erase knop: Gum mode, hiermee kan de mask worden bijgewerkt.
Draw Size knoppen: Groote van de Brush instellen waarmee je de mask gaat tekenen
Zoom knoppen: De vergroting of verkleining van het camera beeld aanpassen
Display model: Hier kan worden gekozen om, alleen beeld, alleen Mask, of alle 2 weer te geven in het rechter gedeelte van het scherm.
Clear Mask: Huidige mask wissen
Apply: Huidige gemaakte mask opslaan
Undo changes: Laatste veranderingen terug draaien.

Configuration: hardware scherm.

a)Wat is de bedoeling van het scherm?

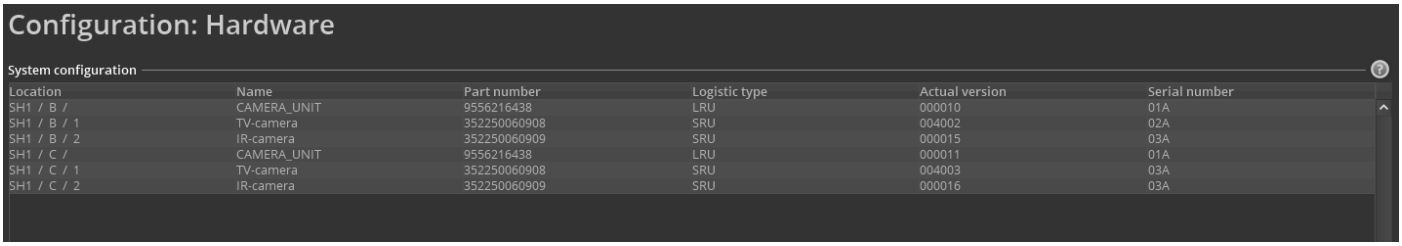
In dit scherm kunnen de hardware welke geïnstalleerd in het huidige systeem worden opgezocht. Het geeft een overview, van de locatie, naam, onderdeel nr, logistiek type, actuele versie en serie nr.

b)Wat voor elementen staan op het scherm?

Een grid met daarop de verschillende bovengenoemde velden.

c)Wat betekenen deze elementen?

Location: Locatie van onderdeel
Name: naam van onderdeel
Part nr: nummer van onderdeel
Logistic Type: geeft aan of het een Line of een shop replaceable onderdeel is
Serial nr: Serie nummer van part



Configuration: sensor head alignment scherm.

a)Wat is de bedoeling van het scherm?

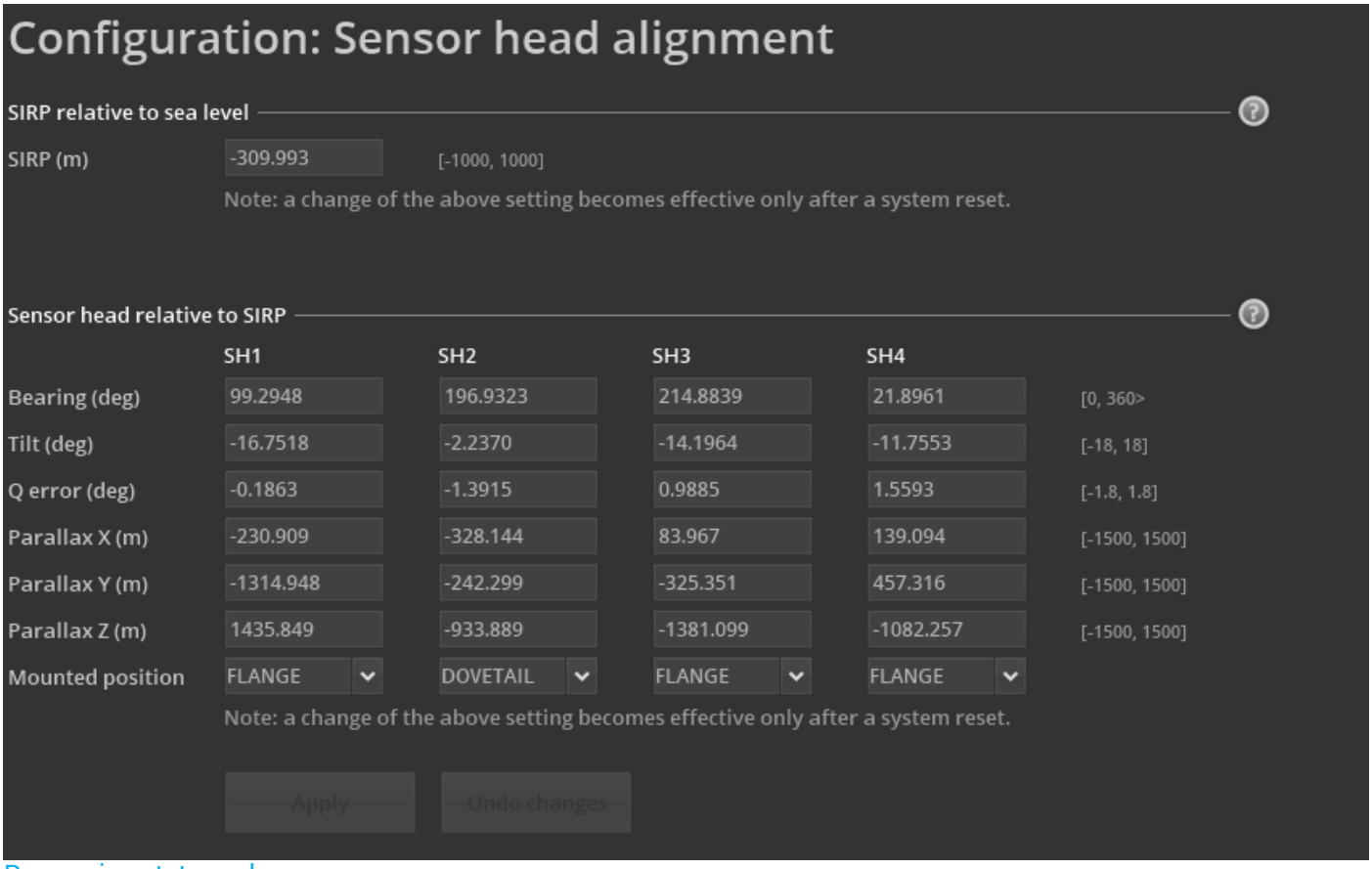
Hiermee kunnen een veelvoud van variabelen worden opgeslagen die nodig zijn voor referentie kader voor het processing unit. Bevat informatie over de plaatsing van de Sensor Heads, en zal alleen bij installatie van het systeem worden gebruikt of als er iets aan de plaatsing van de Sensor Head word aangepast.

b)Wat voor elementen staan op het scherm?

2 Sub-schermen. SIRP relative to sea level. Sensor Head relative to SIRP: Locatie van Sensor Head t.o.v. SIRP.Er staat tekst vakken in het Sensor Head relative to SIRP subscherm met daarin de variabelen die iets zeggen over de plaatsing van de Sensor Heads. Ook kan in het SIRP relative to sea Level sub scherm de SIRP waarde worden ingevuld. De verschillende tekstvakken kunnen ten allen tijde worden aangepast. Ze hebben elk achter het tekst van een indicator staan. Onderaan de pagina staat een Apply/ Undo changes knop. Ook staan er nog voor iedere Sensor Head een Mounted position combobox.

c)Wat betekenen deze elementen?

APSIRP tekst veld: De afstand tussen de zee spiegel tot het interne referentie punt van het schip
APBearing tekst veld: Sensor Head gezichtsveld verhouding tot de scheeps fore-aft lijn
APTilt tekst veld: de draai hoek offset van de sensor
APQ error tekst veld: Q error in de Sensors Head ophanging
APParralel x tekst veld: X-offset van de Sensor Head
APParralel Y tekst veld: Y-offset van de Sensor Head
APParralel Z tekst veld: Z-offset van de Sensor Head
APMounted Position i-combobox: 2 opties FLANGE of DOVENTIAL, instelling waarmee de offsets kunnen worden doorgerekend in de gewenste waardes.
APApply: Sla de nieuwe instellingen op
APUndo Changes: laatste verandering terug draaien.



Processing status scherm.

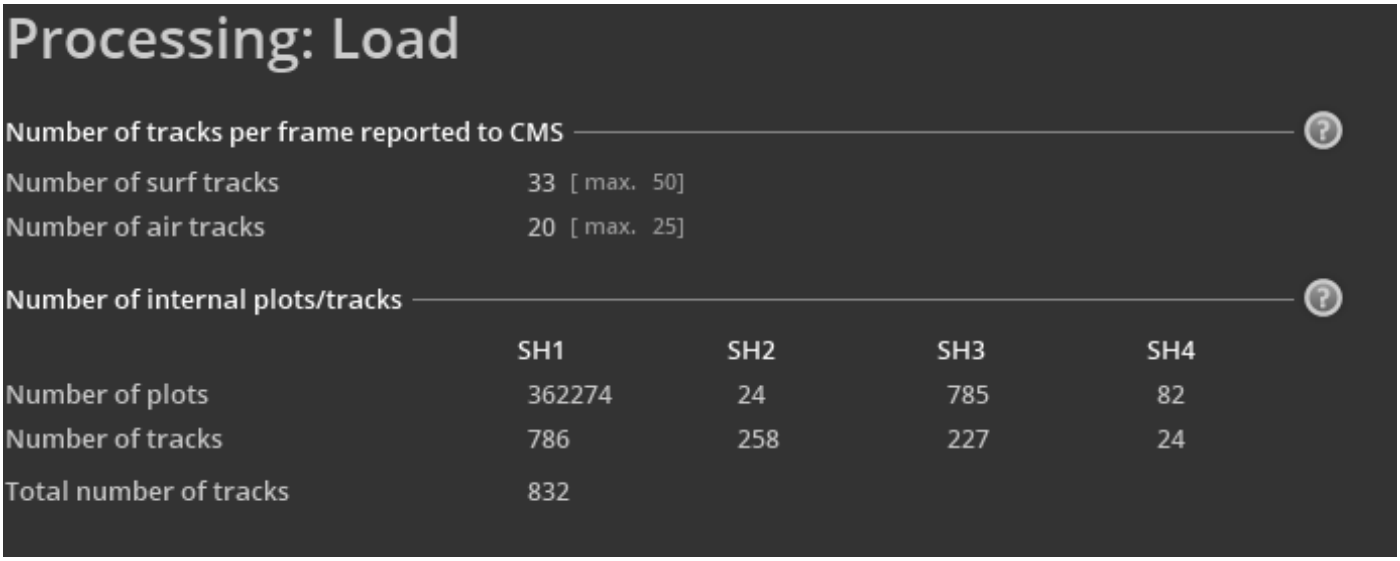
a)Wat is de bedoeling van het scherm?

Hiermee kan de Maintainer checken of er ook echt wat mis is met de Sensor Heads. Hier staan de aantal tracks en plots die worden verwerkt. Alleen voor diagnose. De Maintainer kan verder zelf niets aanpassen.

b)Wat voor elementen staan op het scherm?

2 sub schermen. Number of tracks per frans reported to CMS: Aantal tracks welke worden doorgegeven aan het CMS. De mask heeft hier invloed op, maar ook de CMS zelf doordat verschillende soorten tracks aan en uit kunnen worden gezet.
Numer of internal Plots tracks: Hier worden het aantal interne plots/tracks berekent.
c)Wat betekenen deze elementen?

Number of surf tracks: Aantal tracks op het water
Number of air tracks: Aantal tracks in de lucht.
Number of tracks: Tracks per Sensor Head
Number of plots: Plots per Sensor Head.



Infra: Power and status scherm.

a)Wat is de bedoeling van het scherm?

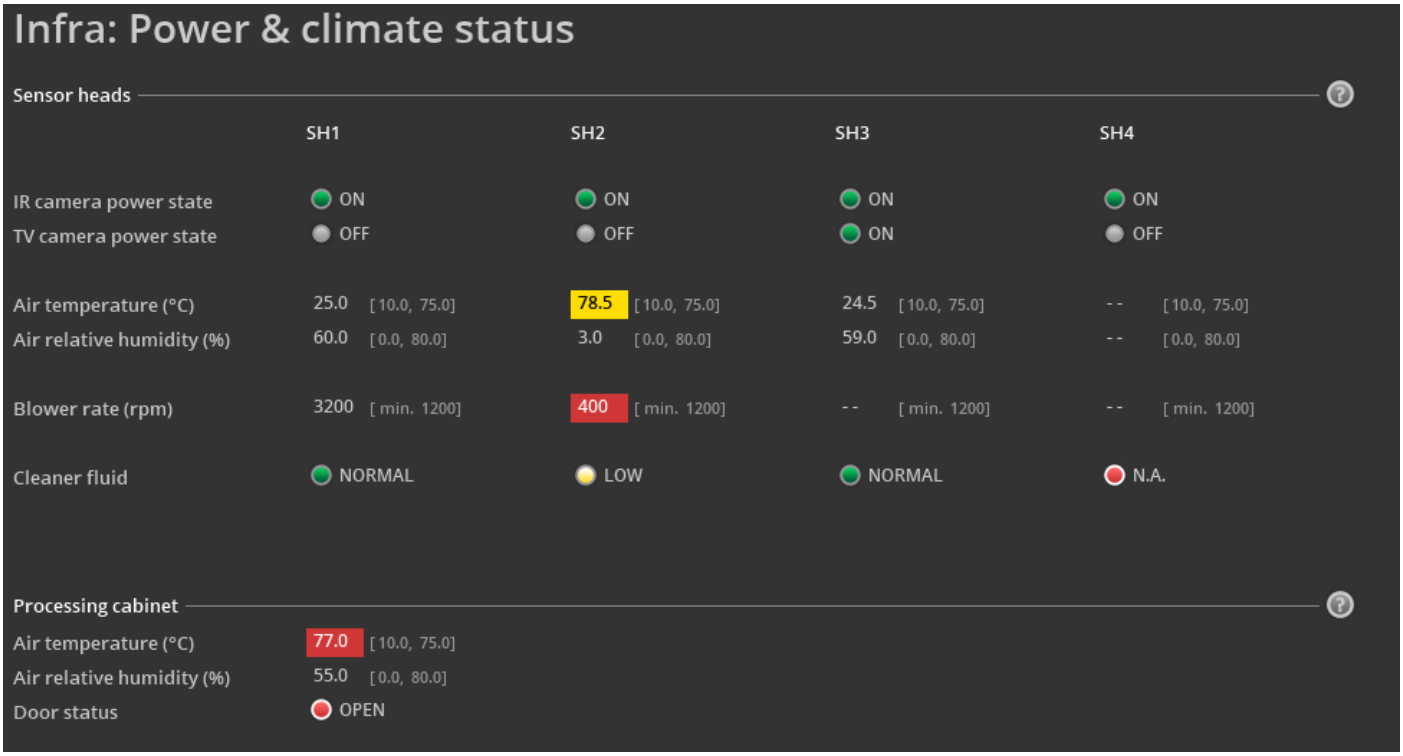
Informatie verschaffing over de verschillende condities waarin de Sensor Heads/processing cabinets verkeren. Er kan hier niets worden aangepast. Het scherm kan alleen maar gebruikt worden voor diagnose.

b)Wat voor elementen staan op het scherm?

De 2 subschermen Sensor Heads en Processing cabinets. Sensor Heads susbscherm is opgedeeld in Power States, Air Temperature, Air humidity, Blower rate en Cleaner fluid. Deze verschillende variabelen worden opgedeeld per camera. In het Processing Cabinet subscherm staan de variablen voor Air temprature, Air humidity en Door status.

c)Wat betekenen deze elementen?

IR camera power state indicator: geeft de status weer van de camera groep van de Sensor Head.
TV camera power state indicator: “”””
Air temperatire tekst veld: Geeft de lucht temp aan per Sensor Head
Air humidity combo tekst veld: Geeft de lucht vochtigheid aan per Sensor Head
Blower rate combo tekst veld: Geeft de omwentelingen van de koeler aan per Sensor Head.
Cleaner fluid indicator: Geeft aan of de koelvloeistof op is per sensor Head
Air temperature combo tekst veld: Geeft de temp aan in het Processing cabinetAir humidity combo tekst veld: “”””
Door status indicator: Geeft aan of de cabinets kast open is of niet



External interfaces: NAVS scherm.

a)Wat is de bedoeling van het scherm?

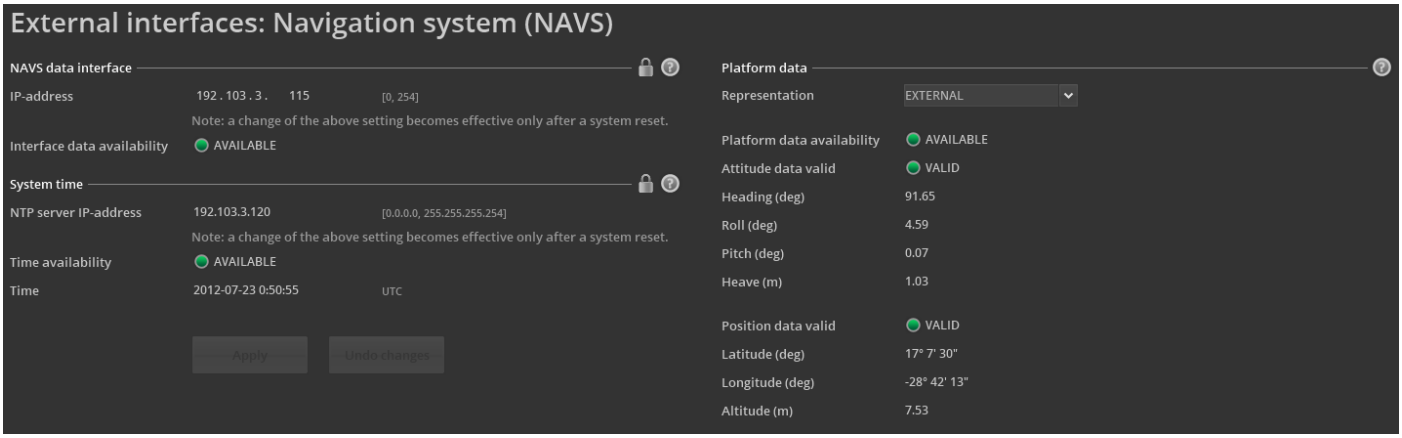
Hier kan de Maintainer informatie vinden over het beschikbaar zijn van de positie en bewegings data van het NAVS. Deze informatie wordt door ge Gatekeeper gebruikt. Dus als er iets mis is kan met deze informatie een diagnose gemaakt worden. Voor bepaalde velden van dit scherm is het nodig dat de maintainance state word aangezet.

b)Wat voor elementen staan op het scherm?

3 subschermen. NAVS data interface. Over waar de data te vinden is, ip adress, en of er een verbinding is. System time subscherm over de waar de systeem tijd gevonden kan worden, ip adress, en of er een verbinding is. Platform data subscherm gaat over informatie over de positie en deck van het schip en de betrouwbaarheid en beschikbaarheid hiervan.

c)Wat betekenen deze elementen?

APIp-adress combo tekst veld: waar de informatie over de data vandaan moet komen
Interface data availability indicator: over het beschikbaar zijn van deze data
APNTP server ip-adress combo tekst veld: waar de systeem tijd gevonden kan worden
Time availability: het beschikbaar zijn van deze informatie
Time tekst veld: de systeem tijd
Apply knop: Wijzigingen in dit scherm accepteren
Undo Changes knop: Laatste verandering terug draaien
Representation combo-box: Intern of externe referentie
Platform data availability indicator: Beschikbaarheid van de platform data
Attitude data valid indicator: Of deze informatie ook betrouwbaar is
Heading tekst veld: De hoek waaronder het platform zich bevind tov
Roll tekst veld: hoek waaronder de het
Pitch tekst veld:
Heave tekst veld:
Position data valid: Of de positie data betrouwbaar is
Latitude tekst veld: Lengtegraad schip
Longtitude: Breedtegraad schip
Attitude: Hoogte schip.



External interfaces: CMS scherm.

a)Wat is de bedoeling van het scherm?

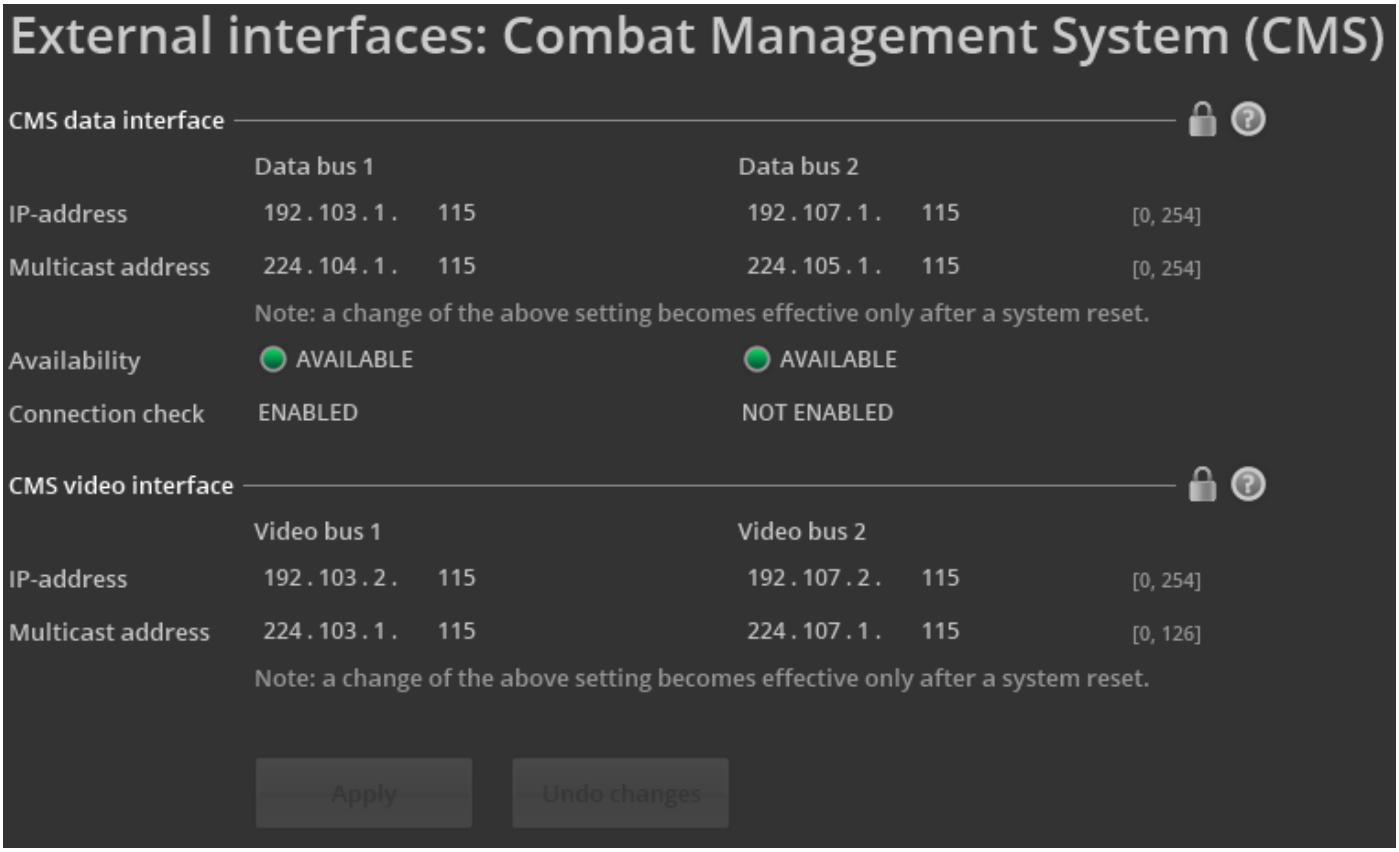
Dit scherm bevat informatie over de ip-adressen en beschikbaarheid van de CMS data bussen en ook de CMS video busen. Deze plaats kan alleen worden aangepast als de maintainace mode is ingeschakeld.

b)Wat voor elementen staan op het scherm?

2 subschermen voor CMS data interface en CMS video interface. In het CMS data interface staat informatie over de plaats en beschikbaarheid van de CMS data interface per data bus. Ook kan hier worden aangegeven worden of deze bussen worden gecheckt. In de CMS video bus interface sub scherm staat informatie over de plaats van de CMS video interface

c)Wat betekenen deze elementen?

APIP-adress combo tekst veld: De plaats van de CMS data interface en CMS video bus voor de controle en status berichten per bus
APMulticast adress combo tekst veld: plaats van de tracks en plots data per bus
Availability indicator: Beschikbaarheid van de data plaats
APMulticast adress combo tekst veld: basis plaats voor de CMS video interface data
Apply knop: Veranderingen accepteren
Undo changes: Laatste verandering terug draaien



Diagnostics: faults scherm.

a)Wat is de bedoeling van het scherm?

In dit scherm kan snel een overzicht gemaakt worden van de status van de capabilities verschillende systemen per Sensor Head met daarbij een globale map van deze Sensor Heads. Als er een fout is in een bepaald systeem wordt in het middelste scherm de mogelijke fout id weer gegeven en in het onderste scherm de bijbehorende onderdelen bij de fout id. Dit scherm is bedoelt voor het oplossen van fouten.

b)Wat voor elementen staan op het scherm?

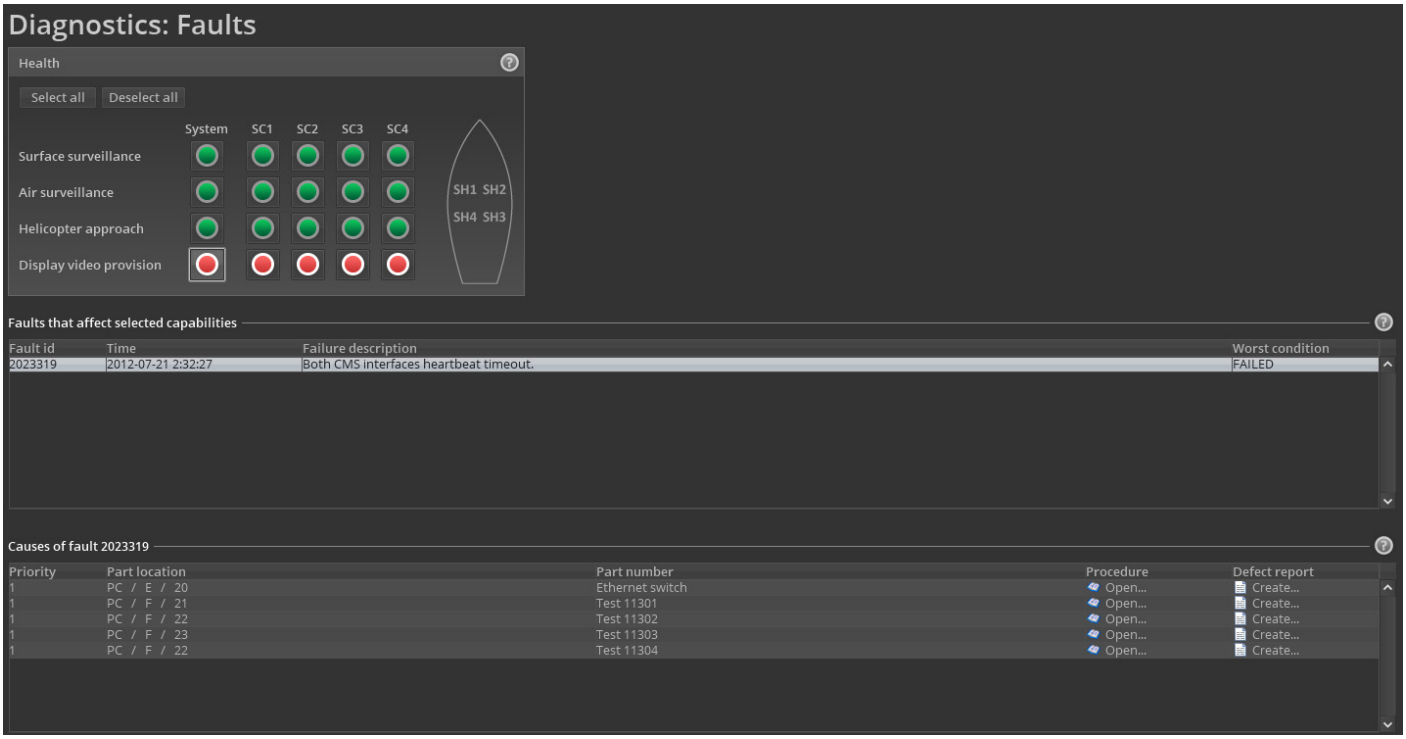
3 subschermen. Health; de gezondheid van de verschillende capabilities van de verschillende systemen per Sensor Head met hierbij een map van deze Sensor Heads. Ook zijn er 2 knoppen om alles te selecteren/deselecteren. Faults that affect selects capabilities; Hierin worden de fouten weergeven van de geselecteerde bovenstaande capabilities. De fout heeft een id, time, failure description en worst condition. In dit scherm kunnen de verschillende fouten worden geselecteerd op basis van welke conditie de part zich in bevind.

In het onderste scherm Causes of fault ….; staan de priority, part location, part number, procedure en defect report van in het bovenstaande scherm geselecteerde fouten . Met dit subscherm kan dus de bijbehorende parts, met hun locatie nummer, procedure om het op te lossen en hiervan gemaakte defect report door de Maintainer worden opgeslagen.

c)Wat betekenen deze elementen?

Health grid combo indicator elementen knoppen: Hierin worden de gezondheid van de verschillende capabilities weergegeven per systeem en Sensor Head.

Select all: alles selecteren van Health element
Deselect all: alles deselecteren van Health element
Fault id tekst veld: De id code van de fout, voor iedere fout uniek
Time tekst veld: tijd wanneer de fout is ontstaan
Failure description tekst veld: beschrijving van de fout
Worst condition: de ergste impact van de fout op de capabilities
Priority: De prioriteit van onderdeel waar de Maintainer naar moet kijken voor het oplossen van de fout.
Part location: De locatie van de onderdeel
Procedure knop: De procedure voor het repareren/vervangen van het part. Deze linkt door naar de html handleiding pagina
Defect Report knop: Link naar het defect report van het bepaalde part. Linkt door naar ander deel MC



Diagnostics: defect report scherm.

a)Wat is de bedoeling van het scherm?

Met dit scherm kan de Maintainer de fout beschrijven met de automatisch ingevulde zaken als hij doorgelinkt is vanaf de Faults scherm. Hierin kan de Maintainer ook een korte beschrijving doen van wat hij heeft gedaan om de fout op te lossen of wat er nog niet is gelukt. Deze informatie wordt naar Thales gestuurd voor feedback, hierbij moet dan nog wel een eventlog worden toegevoegd voor de volledigheid der informatie.

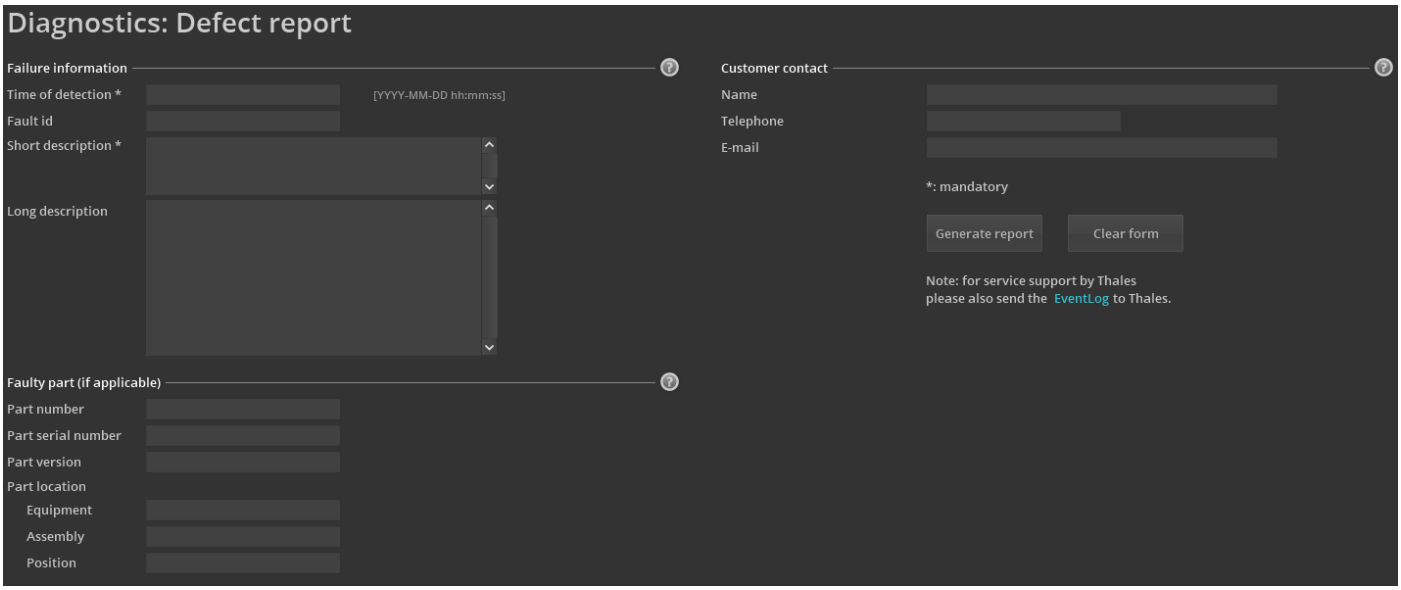
b)Wat voor elementen staan op het scherm?

3 subschermen, Failure information, Faulty part en costumer contact. In het Failure information kunnen naast de automatisch gegenereerde time of detection, Fault id en Short description nog dingen worden aangevuld en nog een Long description worden toegevoegt. Faulty part scherm kan de maintainer naast de automatisch gegenereerde Part number en Part location(Equipment, Assembly en Position) nog het Part serial number en Part version worden toegevoegt. In het laatste subscherm Costumer contact, kunnen de Name, Email en Telephone van de Maintainer worden ingevuld. Hieronder staan nog 2 knoppen Generate Report en Clear form om het report op te slaan of te wissen. Ook staat hier nog een hyperlinkje naar het Eventlog scherm van de interface

c)Wat betekenen deze elementen?

De zijn bijna allemaal hetzelfde als in het Diagnostics: Fault scherm. Wel zijn nu alle tekst velden aanpasbaar Nieuw hier zijn:

APLong description tekst veld: Hier kan een lange beschrijving van het defect neergezet worden.
APPart Serial numer: Serie nr van het onderdeel
APVersion: Versie van het onderdeel
APName: Naam van de Maintainer welke het defect geprobeerd heeft op te lossen
APTelephone: Telefoon nummer van deze Maintainer
APE-mail: Email adress van deze persoon
Generate report knop: Hiermee kun je het defect report opslaan
Clear form: Hiermee kun je het defect report weer verschonen
Eventlog hyperlink: Een hyperlinkje welke je doorlinkt naar het Diagnostics: Event Log



Diagnostics: event log scherm.

a)Wat is de bedoeling van het scherm?

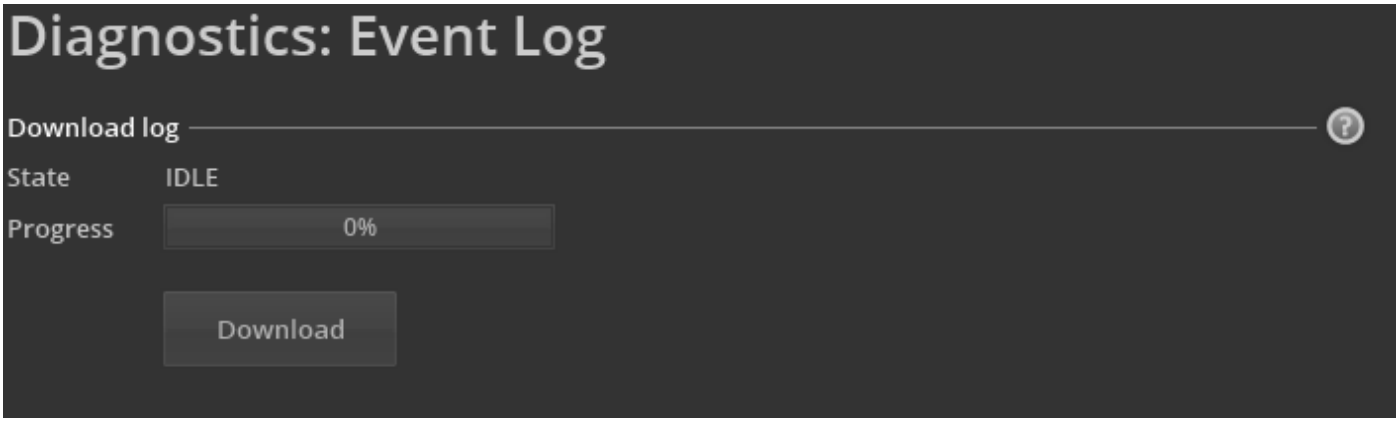
Met dit scherm kan de Maintainer het eventlog generenen. In het eventenlog staat informatie over de werking van het systeem, optreden van fouten. Dit wordt meestal meegeleverd met het Defect report zodat Thales een compleet beeld heeft in welke staat het systeem verkeerde toen de fout optrede in het syteem

b)Wat voor elementen staan op het scherm?

1 subscherm. Hierin staat alleen de State, Progress en Download. Met dit scherm kan de Maintainer alles doen qua event logging

c)Wat betekenen deze elementen?

State tekst veld: Of de Event Log al bezig is.
Progress bar: Hoever de voortgang is voor het ophalen van de eventlog van de HD.
Download knop/ Dialog: Deze knop opent een popup scherm waarmee je het gewenste eventlog kan selecteren



Diagnostics: data recording scherm.

a)Wat is de bedoeling van het scherm?

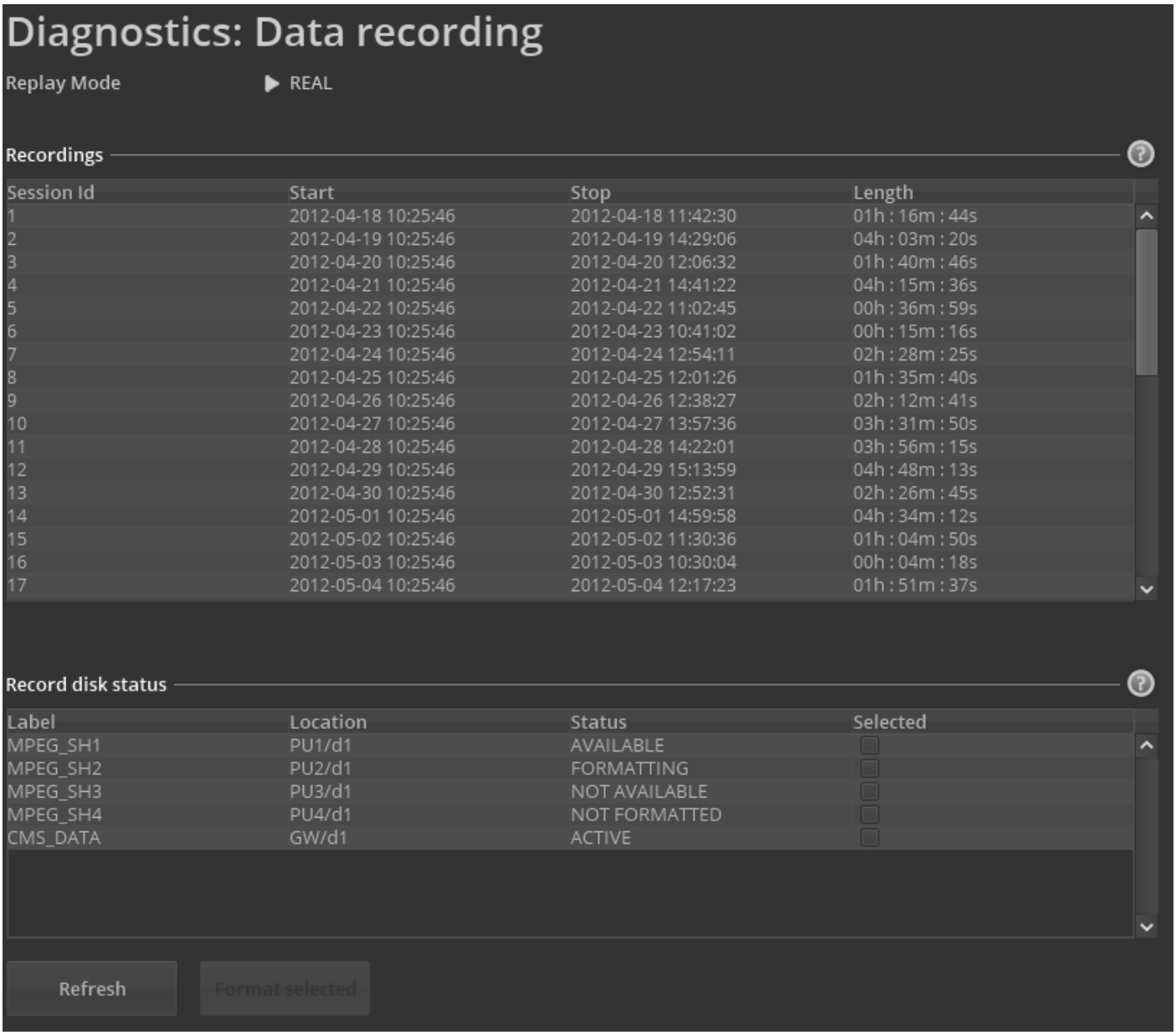
Dit scherm kan gebruikt worden om te bekijken wanneer welke video data is opgeslagen en waar deze data op staat. Ook kan er gevonden worden wat de status van de HD is waarop deze data staat, deze HD's kunnen ook geformat-teerd worden als de maintainace mode aanstaat. Dit kan gebruikt worden als de Maintainer een nieuwe HD's heeft geïnstalleerd.

b)Wat voor elementen staan op het scherm?

2 subschermen, Recordings en Record disk status. Ook is de bovenaan de pagina de Replay mode te vinden, dit zegt iets over welke data de operator kan bekijken. Deze status kan ook alleen door de operator worden aangepast. Recordings subscherm geeft een lijst van alle opgenomen sessies. Deze sessies worden aangeduid met een Id, Start tijd, Stop tijd en totale lengte van de track. De Operator kan beslissen wanneer de data wordt opgenomen en voor hoelang. In het Record disk status scherm kan gevonden worden wat de status van de geïnstalleerde HD's is. Elke geïnstalleerde disk heeft een Label, Location, Status en een Selected box. Onderaan het scherm bevinden zich nog 2 knoppen. Refresh en Format selected.

c)Wat betekenen deze elementen?

Replay Mode indicator: Geeft aan of de beelden welke de operator aan het kijken is een Replay zijn of Real time.
Session id tekst veld grid: De id van de sessie
Start tekst veld grid: Start tijd van de sessie
Stop tekst veld grid: Stop tijd van de sessie
Lengt tekst veld grid: Duur van de opname
Label tekst veld grid: Unieke label van de bepaalde opslag plaats
Locatie tekst veld grid: Locatie van deze opslag.
Status tekst veld grid: Status van de opslag medium
Selected check box: Hier kan de Maintainer bepaalde schijven aan of uit zetten voor het formateren
Refresh knop: Ververs de Data Recordings
Format selected knop: Format de geselecteerde opslag plaatsen



Overview scherm.

a)Wat is de bedoeling van het scherm?

Dit is het belangrijkste scherm voor een Maintainer. Hierop wordt de status van alle onderdelen, interfaces, camera's en capabilities weergegeven. Ook kan de Maintainer de LoEC status veranderen in Maintainance waardoor in de rest van de interface vele opties worden ge-unlocked en bijv. het systeem aan of uit zetten.

b)Wat voor elementen staan op het scherm?

3 subschermen en 1 health en availability scherm. Status wordt de system status opgevraagd. Deze kan ook worden aangepast als de Maintainer in dit zelfde scherm de LoEc(Level of External Control). Interface availability zegt iets over de beschikbaarheid van de verbonden interfaces. Camera power state geeft de status van de verschillende sensor heads en camera's.. Met Apply en Undo changes kun je de opties onder status accepteren en weer terug draaien.

c)Wat betekenen deze elementen?

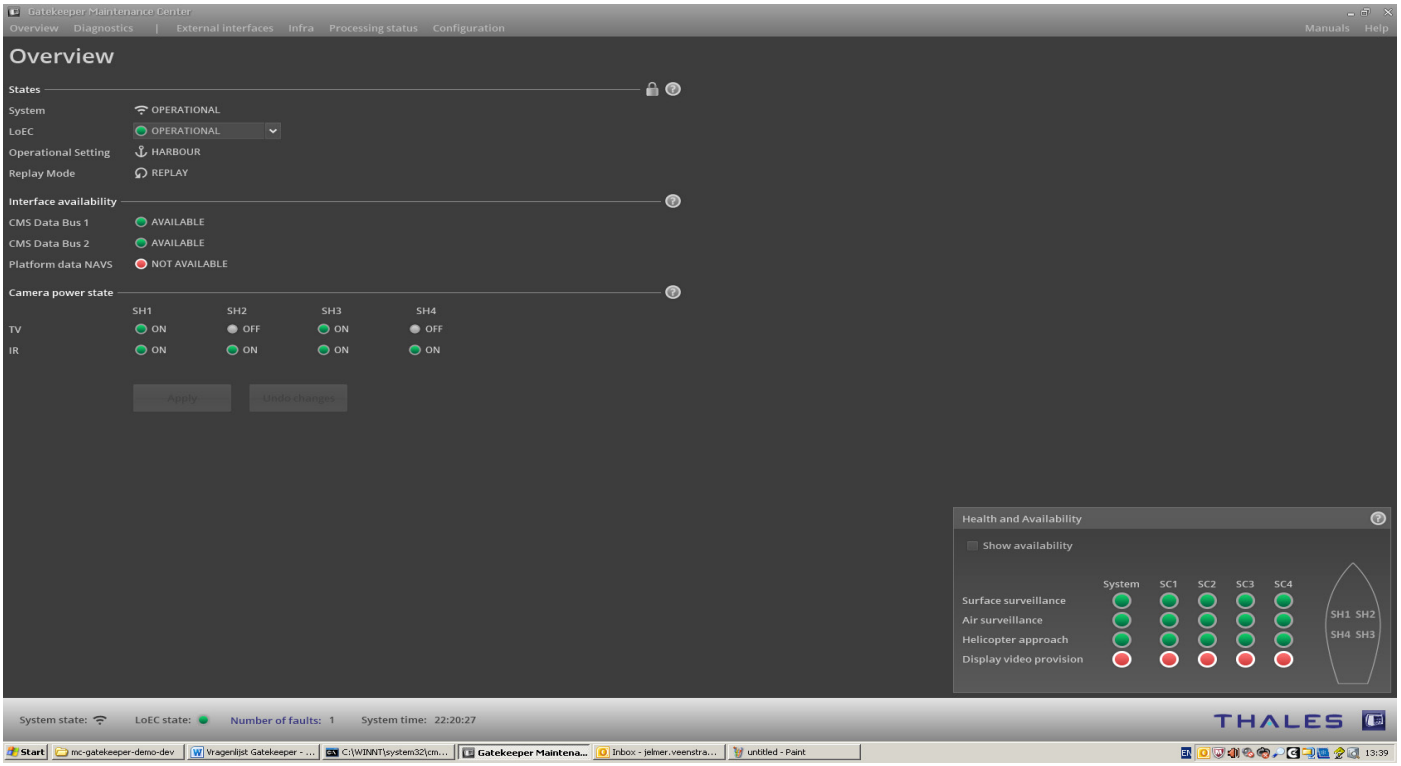
System indicator combo box: Laat zien wat de status van het systeem is. Als de maintainance mode aan staat dan kan de Maintainer de status van het systeem hier veranderen.

LoEC indicator combo box: Hiermee kan de Maintainer de Level of External Conctrol aanpassen. Dus o.a. de MC naar de maintainance mode zetten

Operational setting indicator combo box: Hiermee kan de omgeving waarin geopereerd word aangepast worden. Bijv Haven

Replay mode indicator tekst veld: Hier kan de Maintainer aflezen welke informatie de Operator krijgt. Deze kan hij niet aanpassen

Health en Availability scherm indicator knop: Als er op 1 van deze status knoppen wordt gedrukt, dan wordt de Maintainer automatich doorgelinkt naar het Diagnostics: Fault menu scherm met daar de geselecteerde fout gehigh-light.



Menu balk

a)Wat is de bedoeling van het scherm?

Dit scherm blijft altijd staan. Hierop kan de gebruiker snel naar het gewenste scherm navigeren. Ook krijgt hij een globaal overzicht van het functioneren van het systeem en het aantal kritieke fouten. De gebruiker weet ook meteen dat hij met een Thales product te maken heeft.

b)Wat voor elementen staan op het scherm?

Menu items, manuals, help en onderaan informatie over het systeem.

c)Wat betekenen deze elementen?

Menu balk: Hier kan de Maintainer een scherm uitkiezen en hierheen navigeren
Number of Faults knop/ tekst veld: Aantal nr fouten, als hier opgeklikt word dan wordt er meteen naar Diagnostics: Faults genavigeerd
System time tekst veld: Het tijdstip volgens het systeem, belangrijk voor de fout reporten.
System Status indicator: Hier kan de Maintainer meteen zien of het systeem operationeel is.
Gatekeeper pictogram: Laat zien of er een netwerk verbinding is.
Manual knop: Hiermee kunnen de handleidingen worden opgezocht
Help knop: Hiermee kan extra info worden verkregen

Heuristic evaluation through Heuristic evaluation of user interfaces, Nielsen1990

<Visibility of system status>
The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

<Match between system and the real world>
The system should speak the users' language, with words phrases, and concepts familiar to the users, rather than system-oriented terms. Follow real-world convention, making information appear in a natural and logical order

<User control and freedom>
Users often choose system functions by mistake and will need a clearly marked “emergency exit” to leave the unwanted state without having to go through an extended dialogue. Supports undo and redo.

<Consistency and standards>
User should not have to wonder whether words, situations, or actions mean the same thing. Follow platform convention.

<,Error prevention>
Even better than a good error message is a careful design that prevents a problem from occurring in the first place.

<Recognition rather than recall>
Make objects, actions and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions or use of the system should be visible or easily retrievable whenever appropriate

<Flexibility and efficiency of use>
Accelerators, unseen by the novice user, may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow user to tailor frequent actions.

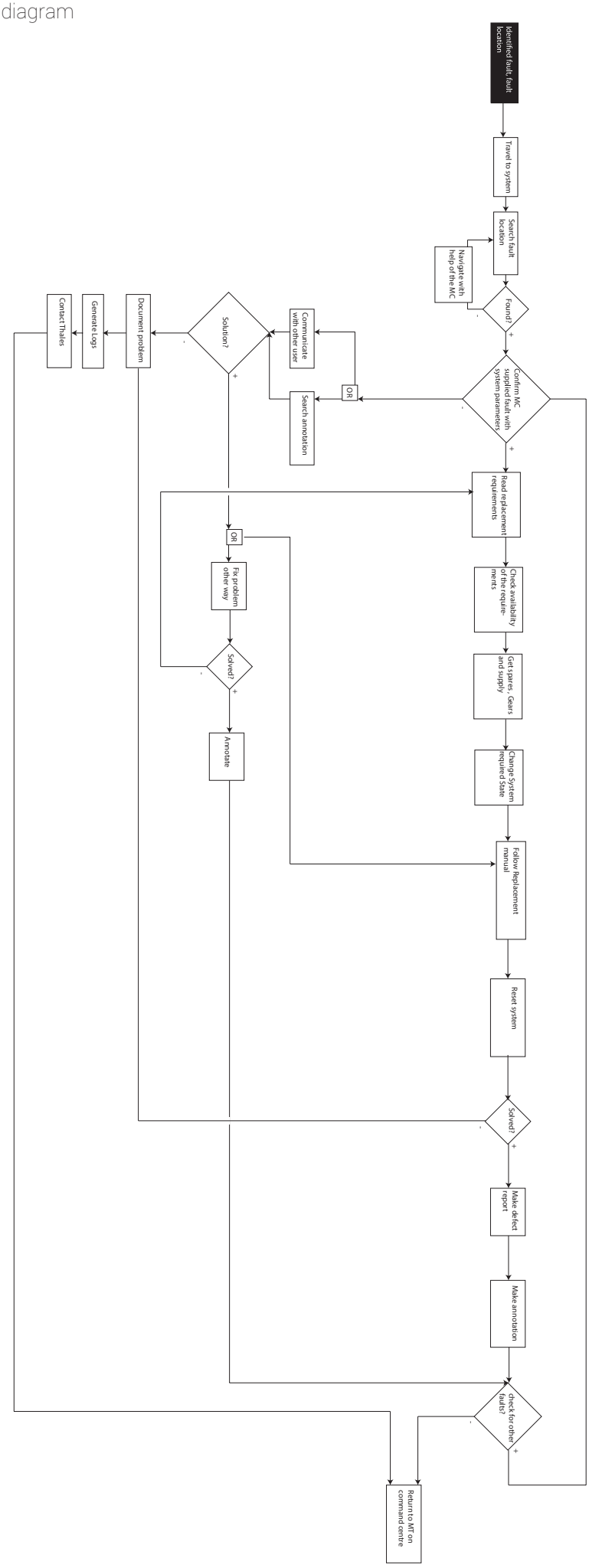
<Aesthetic and minimalist design>
Dialogues should not contain information that is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility

<Help users recognize, diagnose, and recover from errors>
Error messages should be expressed in plain language(no codes). Precisely indicating the problem, and constructively suggesting a solution.

<Help and documentation>
Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focus on the user's tasks, list concrete steps to be carried out and not be too large.

Smartphone	Screen Type	Dimensions mm	Multi-touch	Display size pixels	Display size inches	Camera Photo MP	Camera Video p	LED Flash	OS	Memory mb RAM	Memory Gig	sd-cart slot	Processor Ghz	Sensors	GPS	Java	Battery time Hours(talk time	Weight gram	Wi-fi
Samsung galaxy Nexus	Super OLED capacitive touchscreen, 16M colors	135.5 x 67.9 x 8.9	yes	720 x 1280	4.65	5	1080	yes	Android v4.0+	1	16	no	1.2X2	Accelerometer, gyro, proximity, compass, barometer	yes	yes, with A-Gps support	18	135	a/b/g/n
	Note: - Active noise cancellation with dedicated mic - TV-out (via MHL A/V link) - MP4/H.264/H.263 player - MP3/WAV/eAAC+/AC3 player - Organizer - Image/video editor - Document viewer - Google Search, Maps, Gmail, YouTube, Calendar, Google Talk, Picasa integration - Voice memo/dial/commands - Predictive text input																		
Apple Iphone	LED-backlit IPS TFT	115.2 x 58.6 x 9.3	yes	640 x 960	3.5	8	1080	yes	Apple IOS	512	16/32/64	no	1X2	Accelerometer, gyro, proximity, compass	yes	no	14	140	b/g/n
	note: - MicroSIM card support only - Scratch-resistant glass back panel - Active noise cancellation with dedicated mic - Siri natural language commands and dictation - iCloud cloud service - Twitter integration - TV-out - Google Maps - Audio/video player and editor - Image editor - Voice command/dial																		
HTC One X	Super IPS LCD2	134.4 x 69.9 x 8.9	yes	720 x 1280	4.7	8	1080	yes	Android v4.0+	1000	24	no	1.5X4	Accelerometer, gyro, proximity, compass	yes	yes via MIDP emulator	....	130	a/b/g/n
	note: - MicroSIM card support only - Beats Audio - Active noise cancellation with dedicated mic - TV-out (via MHL A/V link) - SNS integration - MP4/H.263/H.264/WMV player - MP3/eAAC+/WMA/WAV player - Google Search, Maps, Gmail, YouTube, Calendar, Google Talk - Document viewer/editor - Voice memo/dial/commands - Predictive text input																		
Nokia Lumia	AMOLED	116.5 x 61.2 x 12.1	yes	480 x 800	3.7	8	720	yes	windows 7.5 mobile	512	16	no	1.4X1	Accelerometer, proximity, compass	yes	no	14	142	b/g/n

	note: - MicroSIM card support only - SNS integration - Active noise cancellation with dedicated mic - MP3/WAV/eAAC+/WMA player - MP4/H.264/H.263/WMV player - Document viewer/editor - Video/photo editor - Voice memo/command/dial - Predictive text input																		
Samsung I9300 Galaxy S III	Super AMOLED	136.6 x 70.6 x 8.6	yes	720 x 1280	4.8	8	1080	yes	Android v4.0+	1000	16/32/64	no	1.4X4	Accelerom-eter, gyro, RGB sensor, proxim-ity, compass, barometer	yes	yes	....	133	a/b/g/n
	note: - MicroSIM card support only - S-Voice natural language commands and dictation - Smart Stay eye tracking - Dropbox (50 GB storage) - Active noise cancellation with dedicated mic - TV-out (via MHL A/V link) - SNS integration - MP4/DivX/XviD/WMV/H.264/H.263 player - MP3/WAV/eAAC+/AC3/FLAC player - Organizer - Image/video editor - Document editor (Word, Excel, PowerPoint, PDF) - Google Search, Maps, Gmail, YouTube, Calendar, Google Talk, Picasa integration - Voice memo/dial/commands - Predictive text input (Swype)																		


Identified fault, fault location
Travel to system
Search fault location
Navigate with help of the MC
Found?
Confirm MC supplied fault with system parameters
Search annotation
OR
Communicate with other user
Solution?
Document problem
Generate Logs
Contact Thales
Read replacement requirements
Check availability of the requirements
Get spares, Gears and supply
Change System required State
Follow Replacement manual
OR
Fix problem other way
Solved?
Annotate
Reset system
Solved?
Make defect report
Make annotation
check for other faults?
Return to MT on command centre

1	MIL-STD-1472FDoD	Design Criteria Standard – Human Engineering
2	IEC 60417-1	International standard – Graphical symbols for use on equipment – Part 1: overview and application
3	ASD STE100	Simplified Technical English
4	ISBN 92-822-2213-6	The International System Of Units (SI)
5	IEEE 1541-2002	Units of measurements for digital electronics and computing
6		Generic_users_irs, *Thales Internal document. The current guidelines document for the interface design of the MC*
7		GUI Richtlijnen Maintenance Center Visual- and Interaction Design *Thales internal document.The orignal document of the graphical designer whom de signed the MC. The guidelines document is based on this document.*
8	ISBN 978-0-12-088436-0	User Interface Design and Evaluation
9	Weiss 2002, pp 67-70	UI Design Guidelines for Handheld Devices
10	ISBN 978-0-12-088436-0	GUI design guidelines pp 411-412
11		http://developer.android.com/index.html *Android development website*
12		iOS Human Interface Guidelines 2012-03-07 © 2012 Apple Inc.
13		BlackBerry_Smartphones-UI_Guidelines-T893501-980426-0721013746-001-6.0-US
14		Symbian_3_UI_Style_Guide_v1_0_en, Version 1.0; October 7, 2010
15		http://msdn.microsoft.com/en-us/library/hh202915%28v=VS.92%29.aspx *User Experience Design Guidelines for Windows Phone*
16		http://en.wikipedia.org/wiki/Smartphone
17		http://en.wikipedia.org/wiki/Tablet_computer
18		Previous Thales project group
19		seastar_mc_ui_idd scenario document *Thales internal document Scenario document which describes to user possible user, user-actions and occurrence rate of those actions.*
20		http://www.thalesgroup.com/
21		9505002919_irs_006_01 Gatekeeper interface requirements maintenance centre
22		Thales experts
23		Android Os en.wikipedia.org/wiki/Android_(operating_system)