NavVision AMCS

Yard no. 727

Factory Acceptance Test Procedure

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NOTICE

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References

Not applicable.

Introduction

This document describes the AMCS NavVision ships alarm and monitoring Factory Acceptance Test procedures.
The test procedure for FAT is split up into 4 functional groups which are tested separately as far as practical.

- AMCS - Alarm and monitoring system (Test procedure 3, 4, 5,6, 7, 8, 9)
- EAS - Engineers alarming system (Test procedure 10 and 11)
- BNWAS - Bridge navigation watch alarm system (Test procedure 12)
- MIMIC - The visual interface displayed on the screens (Test procedure 13)

The separate test procedures will describe functionality to be verified.

About the System

The AMCS is build and programmed conform following documents:

- Sensorlist :
  Sensorlist 727-r9.18.04.130-V00.06.xlsx

- Network Overview:
  1003353-9910-CFS Rev 1.2

These documents should be part of this test and so be available at first request. Please ask the engineer for these documents if not on site.

Abbreviations list

AMS	Alarm Monitoring System
AM(C)S	Alarm Monitoring (& Control) System
COM	Communication
CPU	Central Processing Unit
DAP	Duty Alarm panel
DM	Dead Man's
ECR	Engine Control Room
EDG	Emergency Diesel Generator
Eng	Engineer
EMS	Energy Management System
ER	Engine Room
ESB	Emergency Switchboard
FAT	Factory Acceptance Test
GA	General Arrangement
GEA	General Engineers Alarm
GPS	Global Positioning System
GRP	Group
HAT	Harbor Acceptance Test
ID	Identification
I/O	Input/Output
IMNL	Imtech Marine Netherlands
MMI	Man Machine Interface
MSB	Main Switchboard
N.A.	Not Applicable
NC	Normally Closed
NO	Normally Open
LAN	Local Area Network
LED	Light Emitting Diode
LPU	Local Processing Unit
MAC	Media Access Control
NMEA	National Marine Electronics Association
OWS	Operator Work Station
PMS	Power Management System
PS	Port Side
SAT	Sea Acceptance Test
SB	Starboard
SMS	Short Message Service
TCP/IP	Transmission Control Protocol/ Internet Protocol
UMS	Unmanned Machinery Space
USB	Universal Serial Bus
WH	Wheelhouse

Safety instructions

This section provides only a summary of the safety requirements and notes in the following sections. To protect your health and prevent damage to the AM(C)S equipment or vessel, it is essential to read and carefully follow the safety instructions.

The indications NOTE, CAUTION and WARNING have the following significance:

NOTE:
An operating procedure, practice or condition etc., which it is important to emphasize.

CAUTION:
An operating procedure, practise or condition etc., which, if not strictly observed, may damage AM(C)S equipment or crash NavVision software.

WARNING:
An operating procedure, practise or condition etc., which, if not carefully observed may result in personal injury or damage to the vessel.

Revision history

Revisions issued since publication.

Issue	Date	Revision	Reason
2.1	July 21, 2015	New version	

Version info for system software, IO configuration and firmware of the IO.

	Request	Action	Acceptance
			FAT
A	Version of NavVision: é é é é é é é ..	Verify	

Test Procedures FAT

1. Verify scope of supply

Scope of supply		Needed	Present
Alarm PC Systems	AMCS Main Server PC (Bridge AMCS Cabinet): Box PC with two TFT screens Keyboard/Trackball wireless (USB)	1	
	AMCS Backup Server PC (ECR AMCS Cabinet): Box PC with one TFT screen Keyboard/Trackball wireless (USB)	1	
Duty Alarm Panel	DAP 1 (Crew Mess room)	1	
	DAP 2 (BNWAS, Wheelhouse)	1	
PLC	PLC 1 (Bridge Cabinet)	1	
	PLC 2 (LPU01)	1	
	PLC 3 (LPU03)	1	
	PLC 6 (ECR Cabinet)	1	
	PLC 7 (LPU04)	1	
	PLC 9 (BNWAS, Bridge Cabinet)	1	
Network	Network Switches Phoenix Contact	6	
	Serial Servers Moxa	6	
Additional Hardware	RS232 to RS485 opto-isolators	6	
	NMEA Interface (GPS Time, Bridge Cabinet)	1	
	Basic Alarm 3 Button Panel (Wheelhouse)	1	
	BNWAS 1 Button Panel (Wheelhouse)	1	

	BNWAS 1 Button Panel (Crew Mess room)	1	
	Basic Alarm 3 Button Panel (Fwd Engine Room)	1	
	Alarm/Log Printer	2	
Additional Hardware	Watch Entrance 3 Button Panel (Aft/Fwd Engine Room)	1	
	Timer Reset Buttons (Engine Room)	4	
	GSM Modem & Antenna (Bridge Area)	1	

Part of FAT setup but not in scope of supply		**Needed**	**Present**
PLC	PLC 4 / MSB PS (CPU only)	1	
	PLC 8 / ESB (CPU only)	1	
	PLC Drive Forward (CPU only)	1	
	PLC Drive Aft (CPU only)	1	
Network	Network Switches (MSB PS & ESB)	2	
	Serial Servers Moxa (MSB PS & ESB)	4	

2. AMCS: Basic Alarm Functionality

Pre-condition: system running with no unacknowledged alarms

Step	Description	Required Steps	*Expected result*	*Remarks*
1	Generate alarm	Remove test-wire from a PLC	Relevant alarm is indicated in top right corner of every screen (for Stations that are allowed to see the alarm)	
2	Alarm is generated	verify the output to buzzers and lights where applicable	Alarm output is enabled	
3	Check alarm page for consistency	On all AMCS screens (where alarm is allowed to show): Open the alarm page	The alarm page shows all unacknowledged (new) alarms as blinking and on top of the list	
4	Acknowledge alarm on Bridge PC (Main Server)	Double click on the alarm line or click on the silence button	Acknowledging is not possible	
5	Acknowledge alarm on the Duty Alarm Panel in the Crew Mess room	Double click on the alarm line or click on the silence button	Acknowledging is not possible	
6	Acknowledge alarm on ER PC (Backup Server)	Double click on the alarm line or click on the silence button	Alarm is acknowledged and sound stops, alarm is still visible in list	
7	Rectify alarm	Restore removed test-wire	Alarm is automatically removed from list	

3. AMCS: Testing of Redundancy

Pre-condition: system running with no unacknowledged alarms

Step	Description	Required Steps	*Expected result*	*Remarks*
1	Generate alarm	Remove test-wire from a PLC	Relevant alarm is indicated in top right corner of every screen (for Stations that are allowed to see the alarm)	
2	Alarm is generated	verify the output to buzzers and lights where applicable	Alarm output enabled	
3	Check alarm page for consistency	On all AMCS screens (where alarm is allowed to show): Open the alarm page	The alarm page shows all unacknowledged (new) alarms as blinking and on top of the list	
4	Simulate a failure of the Server PC in the AMCS ECR Cabinet	Shutdown ECR PC	New alarm is generated showing broken AMCS network connection	
5	Automatically Server PC in the AMCS Bridge Cabinet will get an alarm message to take over		New alarm generated for fallback/takeover of AMCS ER Alarm Group Rights to Bridge PC (visible on Bridge PC)	
6	Acknowledge test-wire alarm on Bridge PC	Double click on the alarm line or click on the silence button	Acknowledging is not possible	
7	Acknowledge Bridge Fallback For ECR alarm	Double click on the alarm line	Take-over alarm is removed from alarm list. Bridge PC takes over rights of ECR PC. system keeps running	

Step	Description	Required Steps	*Expected result*	*Remarks*
8	Acknowledge test-wire alarm on Bridge PC	Double click on the alarm line or click on the silence button	Alarm is acknowledged and sound stops, alarm is still active in list	
9	Rectify alarm	Restore removed test-wire	Alarm is automatically removed from list	
10	Simulate server repair	Boot up ECR PC	AMCS ER Alarm Group Rights are transferred back to ECR PC	
11	Generate alarm	Remove test-wire from a PLC	Relevant alarm is indicated in top right corner of every screen (for Stations that are allowed to see the alarm)	
12	Acknowledge alarm on Bridge PC	Double click on the alarm line or click on the silence button	Acknowledging is not possible	
13	Acknowledge alarm on ECR PC	Double click on the alarm line or click on the silence button	Alarm is acknowledged and sound stops, alarm is still visible in list	
14	Rectify alarm	Restore removed test-wire	Alarm is automatically removed from list	

4. AMCS: General Engineers Alarm

Pre-condition: system running with no unacknowledged alarms

Step	Description	Required Steps	*Expected result*	*Remarks*
1	Generate alarm	Remove test-wire from a PLC	Relevant alarm is indicated in top right corner of every screen (for Stations that are allowed to see the alarm)	
	Alarm is generated	verify the output to buzzers and lights where applicable	Alarm output enabled	
2	Check Alarm Page for consistency	On all AMCS screens (where alarm is allowed to show): Open the alarm page	The alarm page shows all unacknowledged (new) alarms as blinking and on top of the list	
3	Dond acknowledge the alarm	Do nothing	After 5 minutes a General Engineers Alarm is generated	
5	Alarm is generated	verify the output to buzzers and lights where applicable and extra to the horn.	Alarm output enabled	
6	Acknowledge the test-wire alarm on the Bridge PC	Double click on the alarm line or click on the silence button	Acknowledging is not possible Silencing also not possible	
7	Acknowledge test-wire alarm on the Messroom Duty Alarm Panel	Double click on the alarm line or click on the silence button	Acknowledging is not possible Silencing also not possible	
8	Acknowledge the test-wire alarm on the ECR PC	Double click on the alarm line or click on the silence button	Test Alarm & Gen.Eng.Alarm are both acknowledged and sound stops, test alarm is still active in list	
9	Rectify the test-wire alarm	Restore removed test-wire	Alarm is automatically removed from list	

5. AMCS: Network Alarms

Pre-condition: system running with no unacknowledged alarms

Step	**Description**	**Required Steps**	*Expected result*	*Remarks*
1	Generate network alarm	Disconnect any network cable(s) and wait > 15 seconds	All alarms are shown on the appropriate stations; newest alarm is on top ofthe alarm list	
2	Check Alarm Page for consistency	On all AMCS screens (where alarm is allowed to show): Open the alarm page	The alarm page shows all unacknowledged (new) alarms as blinking and on top of the list	
3	Acknowledge network alarm(s) on the ECR PC	Double click on the alarm line or click on the silence button	Alarm is acknowledged and sound stops, alarm is still active in list	
4	Rectify alarm	Reconnect the disconnected network cable(s)	Network alarm is automatically removed from list	

6. AMCS: Serial Alarm

At this moment it is not possible to test the serial connections during FAT AMCS. To be tested during HAT AMCS.

7. AMCS: Redundant Power Supply Alarm

Pre-condition: system running with no unacknowledged alarms

Step	Description	Required Steps	*Expected result*	*Remarks*
1	Activate the Bridge AMCS Cabinet Redundant Power Supply Alarm	Switch off 24Vdc supply to the Bridge AMCS Cabinet	Relevant alarm is indicated in top right corner of every screen (for Stations that are allowed to see the alarm)	
2	Acknowledge and rectify the Power Supply Alarm	Switch on 24Vdc supply to Bridge AMCS Cabinet. Double click on the alarm line or click on the silence button	The Redundant Power Supply Alarm is removed from the Alarm List.	
3	Activate the ECR AMCS Cabinet Redundant Power Supply Alarm	Switch off 230Vac supply to the ECR AMCS Cabinet	Relevant alarm is indicated in topright corner of every screen & Alarm Output enabled	
4	Acknowledge and rectify the Power Supply Alarm	Double click on the alarm line in the Alarm List & Switch on 230Vac supply to ECR AMCS Cabinet	The Redundant Power Supply Alarm is removed from the Alarm List	
5	Repeat step 1, é 4 for following cabinets: • LPU 01 • LPU 02 (ECR Cabinet) • LPU 03 • LPU 04	Same as step 1, é 4	Same as step 1, é 4	

8. Deadman: Engine Room Attended/Unattended

Pre-condition: system running with no unacknowledged alarms

Step	Description	Required Steps	*Expected result*	*Remarks*
1	Select Engine Room Unattended	Make sure a Duty officer is selected. Than press ñUnattendedò on the Engine Room Watch Entrance 3 Button Panel or on the ECR PC	Engine Room is set to ñUnattendedò. This will be shown on all screens with ER duty rights. On the ER Watch Entrance 3 Button Panel the Attended button (blue) is off.	
2	Generate alarm	Remove test-wire from a PLC	Relevant alarm is indicated in top right corner of every screen (for Stations that are allowed to see the alarm)	
3	Silence Alarm on Bridge Panel	Push Silence button on the Basic Alarm 3 Button Panel or on the PC in the Wheelhouse	AMCS alarm will be silenced (Bridge buzzer off). Alarm can't be acknowledged	
4	Silence Alarm on DAP's	Push Silence buttons on both DAP's	AMCS alarm will be silenced (DAP buzzer off, 2x). Alarm can't be acknowledged	
5	Silence Alarm in the Engine Room	Push Silence button on the Basic Alarm 3 Button Panel in the ECR	Buzzer on all AMCS PC's & DAP's are off. No changes for AMCS Alarm visual indications. AMCS ñUnattendedò state changes to ñAttendedò	
6	Acknowledge alarm and restore fault	Acknowledge alarm on the ECR PC (alarm page)	Alarm is acknowledged. Alarm is removed from all alarm pages. AMCS ñUnattendedò state changes to ñAttendedò	
7	Select Engine Room Attended	Push ñUnattendedò and then ñAttendedò on the Engine Room Watch Entrance 3 Button Panel or on ECR PC (alarm page)	Engine Room is set to ñAttendedò This will be shown on all screens with ER duty rights On the ER Watch Entrance 3 Button Panel the Attended button (blue) is on	

9. Deadman: Engine Room Attended Timer (Deadman Timer)

Pre-condition: system running with no unacknowledged alarms

Step	Description	Required Steps	*Expected result*	*Remarks*
1	Select Engine Room Attended	Push ñAttendedò on the Engine Room Watch Entrance 3 Button Panel	Engine Room is set to ñAttendedò This will be shown on all screens with ER duty rights On the ER Watch Entrance 3 Button Panel the Attended button (blue) is on	
2	Start the Engine Room Attended Timer	Activate timer on the alarm page (password)	Menu appears for password.	
3	Enter password	Enter ñ1234ò	The Engineers Deadman Timer starts running	
4	Engine Room Attended Timer reset	Push timer reset button on: • ER Watch Entrance 3 Button Panel • or on ECR PC alarm page • or push an ER timer reset button (4x)	The Engineers Deadman Timer is set to the default time and starts counting down from there.	
5	Select Engine Room Unattended	Push ñAttendedò on the ER Watch Entrance 3 Button Panel or on the ECR PC (alarm page)	The Engineers Deadman Timer is set to the default time and stopped	
6	Select Engine Room Attended	Push ñAttendedò on the ER Watch Entrance 3 Button Panel or on the ECR PC (alarm page)	The Engineers Deadman Timer starts running	
7	Run for 27 min	Wait 27 min	Alarm displayed on all AMCS screens in public spaces and with ER Duty and	

	(... min FAT)	(...min FAT)	buzzers sound	
8	Wait extra 3 min (é min FAT)		General Engineers Alarm will sound and appears on all AMCS screens.	
9	Accept alarm		Can only be acknowledged on the ECR PC. All AMCS stations go silent. The Engineers Deadman Timer is set to the default time and starts counting down from there.	

10. BNWAS Bridge Navigational Watch Alarm System

Pre-condition: system running with no unacknowledged alarms

Step	Description	Required Steps	Expected result	Remarks
1	Activate BNWAS timer	Activate timer on the alarm screen on the main Bridge DAP or on the Bridge AMCS PC (Password is .....)	BNWAS Timer is running	
2	Timer reset	Move mouse pointer over screen in a a long swipe movement or acknowledge on AMCS bridge screen or push BNWAS timer reset button	Timer is set to the default time and starts counting down from there.	
3	Timer over 12 min (é min FAT)		• Stage 0 *(0 sec)*: Deadman warning alarm Only visual indication on the bridge station • Stage 1 *(15 sec)*: After 15 sec buzzer will sound (on bridge) • Stage 2 *(30 sec)*: 15 sec After visual and audible alarms goes off in back-up officer and/or masterõs location • Stage 3 *(120 sec)*: 90 sec after visual and audible alarms will be shown in crew member areas and public spaces • Eventually after 5 minutes in total the general engineers alarm will go off.	
4	Accept Alarm	Acknowledge on AMCS bridge screen	Alarm is acknowledged. Timer is set to the default time and starts counting down from there.	

11. MIMICS: Mimic Structure and Characteristics

Pre-condition: system running with no unacknowledged alarms

Step	Description	Required Steps	*Expected result*	*Remarks*
1	Opening the CMAL 3 Mimic presentations	Open the CMAL 3 Main Mimic and navigate to the underlying Mimics and back to the Main Mimic Test functionality on the Mimic	• 1- Main Menu Doc P1003353-9910-FPT_01 R1.0	
2			• 2- Generator 1 Doc P1003353-9910-FPT_02 R1.0	
3			• 3- Generator 2 Doc P1003353-9910-FPT_03 R1.0	
4			• 4- Generator 3 Doc P1003353-9910-FPT_04 R1.0	
5			• 5- Emergency/Harbour Generator Doc P1003353-9910-FPT_05 R1.0	

6			• 6- Power Generation Doc P1003353-9910-FPT_06 R1.0	
7			• 7- Power Distribution 400V/230V Doc P1003353-9910-FPT_07 R1.0	
8			• 8- Battery Banks Forward/Aft Doc P1003353-9910-FPT_08 R2.0	
9			• 9- Propulsion Forward Doc P1003353-9910-FPT_09 R1.0	
10			• 10- Propulsion Aft Doc P1003353-9910-FPT_10 R1.0	
11			• 11- Bilge & Fire Doc P1003353-9910-FPT_11 R1.0	
12			• 12- Fuel System Doc P1003353-9910-FPT_12 R1.0	

13			• 13- Cooling Doc P1003353-9910-FPT_13 R2.0	
14			• 14- Ventilation Doc P1003353-9910-FPT_14 R1.0	
15			• 15- Tanks Doc P1003353-9910-FPT_15 R1.0	
16			• 16- Hour Counters Doc P1003353-9910-FPT_16 R2.0	
17			• 17- Pumps Doc P1003353-9910-FPT_17 R2.0	
18			• 18- Energy Management System Doc P1003353-9910-FPT_18 R2.0	
19			• 19- Bridge Alarm & Indicating Monitor Doc P1003353-9910-FPT_19 R1.0	

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12. List of Outstanding Items / Remarks

No.	Description	Action	Solved		Checked	
			Date	By	Date	By
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13. Approval Report

STATEMENT OF ACCEPTANCE*

SHOP TEST	FINAL ACCEPTANCE	PROTOCOL NO.
SUBJECT: Hybrid RO-RO Passenger Ferry Hull number: 727		PROJECT NO.: 1003353 GROUP NO. : ORDER NO. :
		ITEM : AMCS
		DATE :

JOB IDENTIFICATION:

PURCHASER	JOB NO.	ITEM NO.
INSPECTION / SURVEY OFFICE	JOB NO.	ITEM NO.

Agreed by **Imtech Marine Netherlands B.V.**		**Agreed by** **Ferguson Marine**	
Name	:	Name	:
Function	:	Function	:
Date	:	Date	:
Signature	:	Signature	:
Agreed by **Lloyds Register**		**Agreed by** **Caledonian Maritime Assets Limited**	
Name	:	Name	:
Function	:	Function	:
Date	:	Date	:
Signature	:	Signature	:

***This acceptance includes the version of the software, the hardware as tested and the mimics as shown during the procedure and as described in this protocol, as well as all functionality and automatic control sequences if present.**