SIEMENS

Cerberus® LMSmodular Foreign Host Interface FHI Pad Ver.5

Engineering Guidelines

Cerberus
Security
for People
and Assets

Siemens Building Technologies
Cerberus Division

1 Introduction

1.1 Who will use this manual

The FHI Pad - Engineering Guidelines document is addressed to Cerberus technical supervisors who will manage an installation that includes an FHI Pad.
The FHI Pad permits integration between the Cerberus LMS supervising system and a Foreign Supervision System (FSS) handling technological plant management.
This document is designed to assist technical personnel acquire a full understanding of system capabilities and performance. It is a document of concepts and it is aimed to give the reader a better understanding of the integrated system operation.
How to install the hardware and software components is described in the manuals listed in Para. 1.2, "Related documents".

1.2 Related documents

You can refer to the following Cerberus documents to have information about specific products mentioned in this manual. In these manuals you will find also information about how to install and/or configure software and hardware parts needed to properly set up your system.

GW-20 Technical Manual	e1478
NISE Configuration Manual	e1150
LMSmodular Installation Manual	e1862
LMSmodular User Manual	e1865
LMSmodular Configuration Guide	e1863
LMSmodular Configuration Reference	e1864
CDDL Cerberus Dati Data Link	
- Data Link Protocol Description	CDI-135-017-E
CDSF Cerberus Dati Standard Format	
- Application Protocol Description	CDI-130-017-E

You could need also documents from the FSS supplier to understand better FSS internal operation in order to integrate it.

1.3 Document description

This manual is composed of six chapters and three Appendices.

- Chapter 1 describes the document structure.
- Chapter 2 deals with the basic concepts. You should read this section to get a system overview and to understand how technological and security data are represented in LMS and FSS systems. This chapter also includes the system limits.
- Chapter 3 describes how the FSS monitors and manages the security points
- Chapter 4 conversely describes the way LMS handles the technological points.
- Chapter 5 describes interactions among the control panels as well as their limits.
- Chapter 6 contains some notes about configuration and a template that should help you configuring the system.

You are strongly encouraged to read carefully the second chapter that gives you the basic concepts to deal with the integrated system, and then to go through the sections that best fit your need. Remember that this document describes an integrated system, and no sharp boundary can be defined between the FSS and the LMS system!

The Appendices (from A to C) have been inserted for reference and contain some templates to be used during integrated system engineering.

For CS11, CS4, CS4-40 and CC60 please refer to description table on LMSmodular.

Appendix A and B supply you with forms to represent the security points inside FSS (Appendix A) and to represent technological points as cluster of (virtual) CMX units inside LMS (Appendix B).
Eventually, Appendix C gives you a form to define interactions between FSS and LMS devices.
Please do not forget to study carefully the CDSF and CDDL descriptions, supplied in the document listed in the previous paragraph.

2 Basic concepts of integrated system

2.1 System architecture

FHI Pad is an interface that allows the Cerberus danger management System to transfer real time information regarding its status to a supervision system other than Cerberus' LMS, named in this document Foreign Supervision System (short FSS). The FHI Pad interface allows the Cerberus danger management system to receive commands from a Foreign Supervision System.
The same interface could also be used to allow an LMS system to receive information and to send commands to an FSS.
The interface is not designed for file transfer; therefore historic or statistical data will not be available trough it.
The interface adopted complies with Cerberus norm VT397e, "Communication of a danger detection systems with a higher ranking system".

The FHI Pad functions are:

1. to allow a *LMSmodular* system to access a subset of the information points of a non Cerberus *FSS* system. The *LMS* system will therefore be able to receive selected changes of status and to issue selected commands to the specified *FSS* point subset.

2. to allow an *FSS* system to manage a subset of the information messages of Cerberus control panel (CZ10, CZ12). *FSS* will therefore be able to receive selected changes of status and to issue selected commands to Cerberus control panel.

3. to allow automatic interactions between security subsystems connected to the *LMS* gateway and the technological devices connected to the *FSS*.

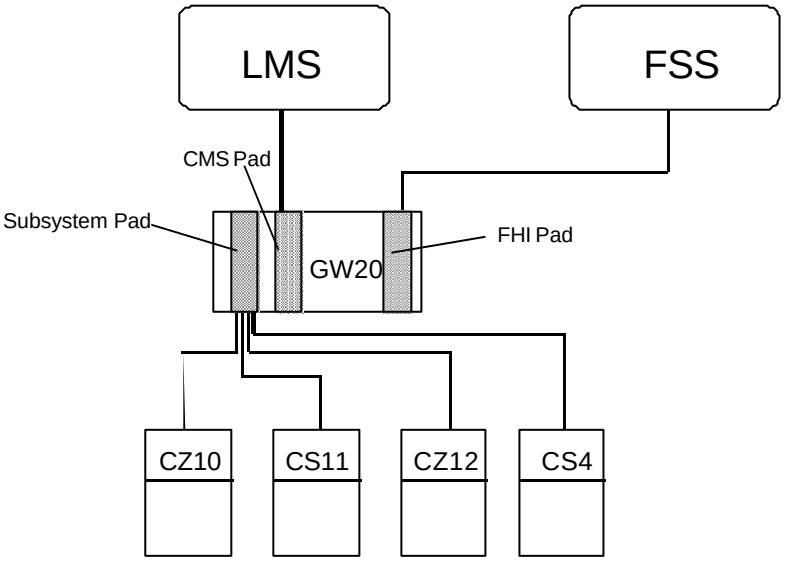

Fig. 1 The LMS-FSS integrated system

LMS

The LMS system is composed of security and safety control panels that acquire data from the field e.g. CZ10 or CS11 (fire detection), CC60 (gas detection) and CZ12, CS4 and CS4-40 (intrusion detection). LMS can be interfaced to various other electronic devices, but only data from CZ10, CS11, CS4 and CZ12 can be integrated in the FSS.
These control panels (or subsystems) get their information from field devices such as smoke detectors, intrusion detectors, contacts etc. According to the software configura-

tion, the control panel will transmit a message to the management station that reflects the status of the device. Up to 16 different states are available for each security/safety device. The messages coming from up to 16 control panel are collected by a dedicated front-end processor, the Gateway GW-20. This microprocessor-based device polls the control panels and communicates with the PC-based management station.

FSS

The Foreign Supervision System is a system supplied by a third-party manufacturer that monitors technological plant.
The FSS should comply with Cerberus Dati Standard Protocol (CDSP) specification and it will be seen by LMS as a standard subsystem.
FHI Pad behaves as a slave, while FSS behaves as a master.

CDSP consists of two levels:
- data-link level (CDDL Cerberus Dati Data Link)
- application level (CDSF Cerberus Dati Standard Format).

FHI Pad needs both the application level (CDSF) and the data link level (CDDL). FHI Pad is able to deal with frames, which can contain up to 8 standard messages/commands.
Standard Protocol deals with standard subsystem which consists of one (or more) items, when we have more than one item we talk of "cluster of items".
Each item consists of points, which give together the whole status of equipment.
The FHI Pad that implements the interface functions is composed of a hardware board to be inserted in the Cerberus' Gateway GW-20 and a software package installed in an EPROM bank on the board

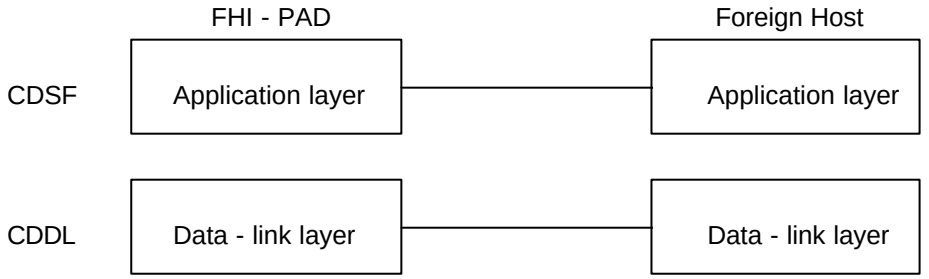

Fig. 2 CDDL and CDSF role in FHI Pad and FSS communication

The FHI Pad is therefore an extension of GW-20 capabilities and it is sold as an add-on device to standard Gateway GW-20. The FHI Pad provides communication using the CDSP (Cerberus Dati Standard Protocol) protocol.
To operate the FHI Pad properly requires a site specific configuration EPROM, which is made using a special utility tool, called FHI_CNF, designed to run on a service-PC.

2.2 Data flow

The data flow in the integrated system is shown in Fig. 3 by black arrows.
LMS controls and receives information from the subsystems connected to the gateway, as in normal stand alone applications (arrows A and B in Fig. 3). The FSS system can partially manage and monitor Cerberus control panel through the FHI Pad connection with FSS (arrows C and D in Fig. 3). The control is only partial because the exchanged messages are only a subset of those available to LMS system.

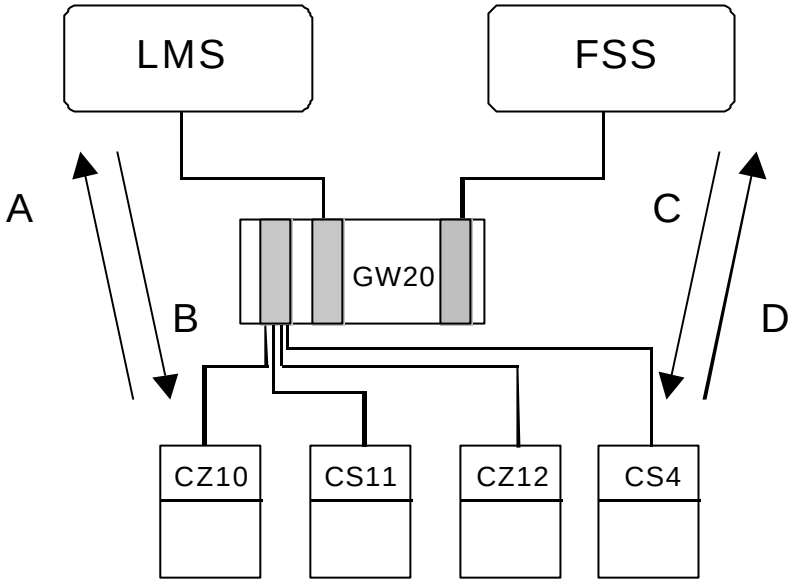

Fig. 3 Normal Data flow

Moreover, it is able to receive information from FSS field devices through the FHI Pad connection with FSS (arrow F in Fig. 4); similarly, LMS is able to send commands to technological plant items (arrow G in Fig. 4).

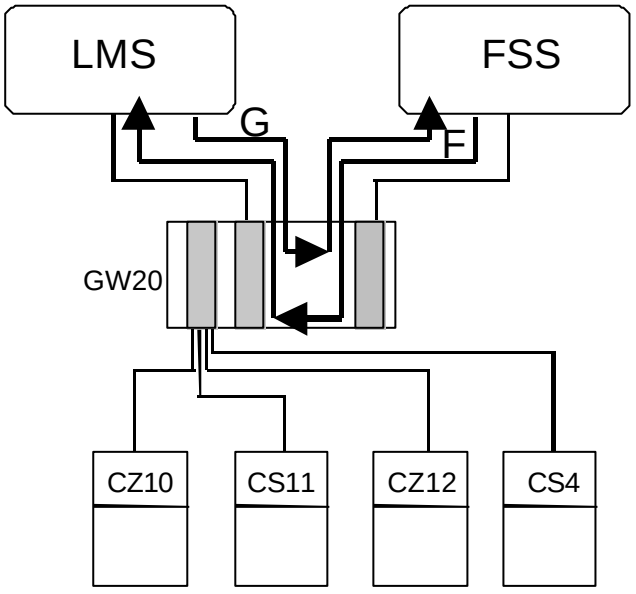

Fig. 4 Data flow during interactions

Interactions between Cerberus subsystems and FSS field devices are allowed by the FHI Pad connection and by the communication between Subsystem Pads and FHI Pad on the gateway bus. These interactions are automatically triggered by an event or a sequence of events arising in LMS systems (arrow marked E in Fig. 5.

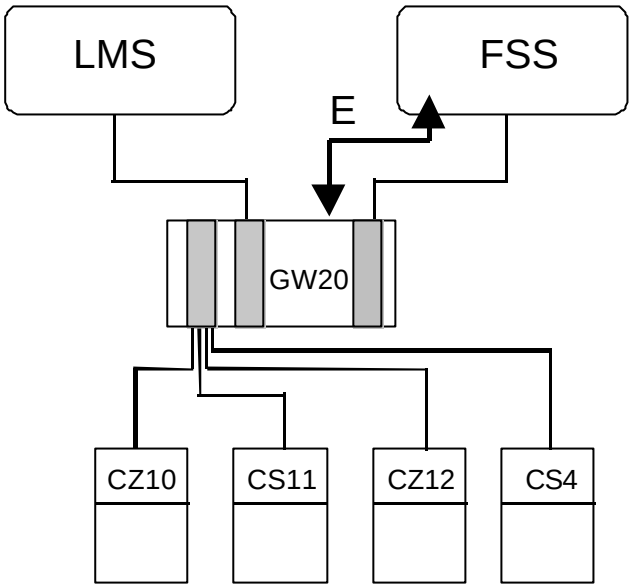

Fig. 5 CZxx managed by FSS

When the status of security/safety device changes, the control panel detects it and transmits a message to the management station containing information about

- the device that underwent the change of status;
- the status it entered as a consequence of the status change, its position and type.

The gateway receives the message and undertakes the following actions, according to the configuration.

- it transmits a message to the LMS supervising system (always) - arrow A and receives commands from LMS - arrow B;
- it transmits a message to the FSS, through the FHI Pad - arrow C and receives commands from the FSS - arrow D;
- If interactions have been configured, it sends commands/information to the FSS to perform actions on the technological plant - arrow E. The commands for interaction are issued directly from the CZxx control panel, i.e. they send a message to the FSS through the Subsystem Pad the CZxx is connected to. Inside the Gateway, the Subsystem Pad dispatches the message to the FHI Pad that issues the message to the FSS. That message does not correspond to the change of status of any physical point installed in the field but it must be interpreted by the FSS as a request to perform some actions.

The message received at LMS and FSS monitoring level is treated according to software configuration.

The security/safety operator, can observe the event displayed on the screen, and can acknowledge receipt of the message and can send commands that change the control panel status. For instance, as a consequence of a fire alarm, he can deactivate part of the security system and can send commands to technological devices connected to the FSS. The operator acts on on-screen software objects and the software converts them into messages, which are sent to the gateway and then to the control panel.

The data flow is similar for a message coming from a technological plant item. The message is received by the FSS, which sends the message through the FHI Pad to LMS. The symmetry however is not perfect. The technological plant analog values are not managed by LMS. Only an FSS operator can change or set up values and display analog data. The technological plant operator cannot however reset a security/safety

control panel. This operation, that cancels pending alarms is a very sensitive one and must be performed by specially trained personnel.

2.3 Data representation

Each physical device connected to the Cerberus or FSS control panel has a finite set of states. These states, such as normal operation, alarm, fault and so on, are modeled and internally reproduced by the monitoring software.

2.3.1 Security points

The way LMS manages the security events is based on the use of a number of tables. The tables connect each physical event (e.g. the door opening signaled by a magnetic contact) with a logical description of such an event (the place in which the event took place, the type of description to be associated to it and how the event has to be managed by LMS itself). This procedure, summarized in Fig. 6, is specific to LMS. Only the outputs of the procedure are significant for the integrated system.
Inside LMS each possible source of information installed in the field (such as a smoke detector, a magnetic contact or a microwave intrusion detection sensor) is modeled as a point. Up to 16 different numerical values can be associated to each point and each value corresponds to a state. A table, called Treatment Table, lets the operator configure the type of event associated to a specific value.

Five types of events can be configured:

SEVERE ALARM
ALARM
FAULT
WARNING
ANOMALY

A further table, called the Description Table specifies how the message is to be displayed on the monitor screen.

User operation (such as alarm acknowledge and reset) or field events (e.g. automatic or manual control panel reset) can change the points' state. In this case the new point value is displayed accordingly to the description and treatment tables as configured.

In the integrated system the FSS operator is able to see a subset of the states of a security point, plus a subset of the commands. In particular, the reset command can be issued only from a LMS station and never from an FSS station.

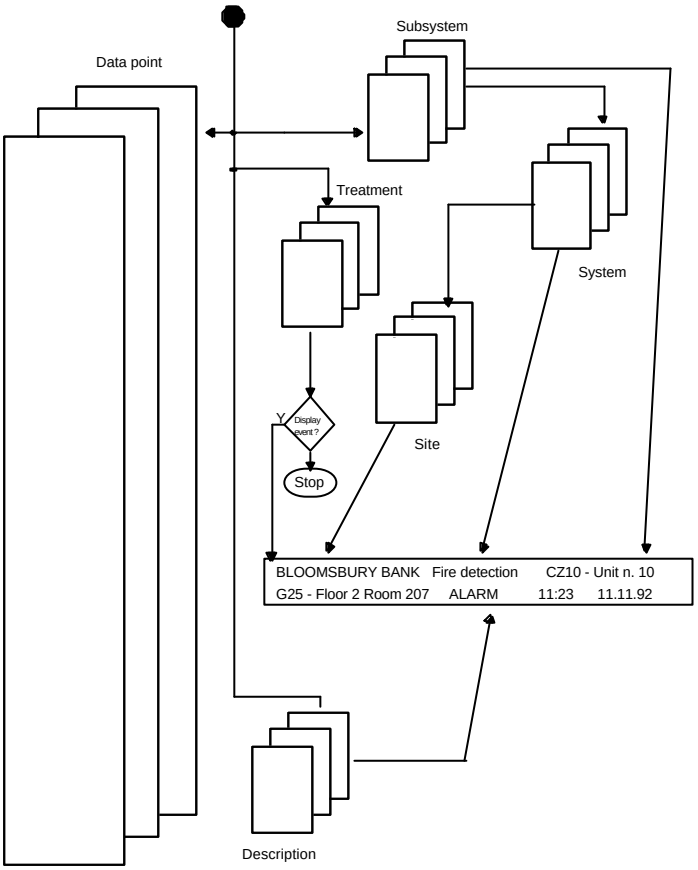

Fig. 6 LMS internal point representation

2.3.2 Technological blocks

The FSS basic unit of information recognised by FHI_Pad is a block. The FHI Pad keeps a table that is an image of the FSS technological points seen by LMS.

At the present state of implementation analogue blocks cannot be fully treated, i.e. analog point alarms can be displayed and treated but the analog value measured cannot be displayed.

The integrated system lets the operator activate a digital output and acknowledge/reset an FSS block status.

2.4 Limits

The implementation of technological plant control on LMS and of security system on FSS has some limits. These limits can be divided into two categories:

- design limits. Some controls, functions or data that are available in one of the two systems (FSS or LMS) are not transferred by the FHI Pad to the other. This means that the technological system seen by LMS is only a subset of the system as seen by FSS. The same applies to security system seen by FSS.
- configuration limits. These limits are imposed by the database dimensions and addressing capabilities of the system. They are intrinsic to system implementation.

2.4.1 Devices supported

The *FHI Pad* is compatible with (see detail object list in 2.4.4 below):

- CZ10 firmware version V27
- CZ12 firmware version V04
- CS11 firmware version EP5 (Z1, Z2, and Z3 extension excluded)
- CS4
- CS4-40
- CC-60

2.4.2 Configuration limits

The integrated system can manage:

- up to 16 subsystems.
- up to 35 subsystems (20 in Cerloop plus 15 directly connected to the gateway
- up to 500 technological points (of which only 100 could be analog points) and up to 2000 security control panel points.

Any alarm transmitted (in either direction) should be received by the other side within 3 seconds.

2.4.3 Summary of functions and performances

The following functions are supported by the FHI-Pad:

- acknowledge commands from the FSS to security control panels. The FSS technological plant operator can acknowledge alarms coming from the security system
- on LMS only the FSS digital points are available
- date and time distribution to the FSS with LMS present
- date and time distribution with LMS absent
- the integrated system does not support analog block value of the FSS
- interactions from the FSS to security/safety control panels.

2.4.4 Security/safety points supported by FSS

A subset of the security/safety points (from a CZ10, CZ12 or CS4) is supported by the FSS. Other peripheral devices supported by LMS as a stand-alone system (refer to LMS documentation for a complete list) cannot be managed by the FSS. Only a subset of telegrams and commands exchanged between the CZ10/CZ12 control panel and the gateway is managed by the FSS.

CZ10 POINT DESCRIPTION
Gateway_link_status
General_fault
Power_fault
Fault_xmit
Fire_alarm_xmit
Fire_alarm
Fire_organization
Fire_part_off
Fire\Tech_groups
Line_elements
Technical_digital_outputs

CC-11 (Pad V5.20) POINT DESCRIPTION
Gateway link status
Control Unit
Power supplies (1-16)
Function unit alarm/status (1-16)
Remote transmission alarms (1-8)
Remote transmission faults(1-8)
Area general alarm (1-16)
Area fire organization (1-16)
Detection zone status
Control zone status
Detection element (input)
Control element (output) without feedback
Control element (output) with feedback
Element status

CC-11 (Pad V5.21) POINT DESCRIPTION
Control unit
Remote terminal
Line interface (1-16)
Remote transmission device (1-8)
CI11 fire unit
CI11 control unit
Fire area (1-16)
Fire section (1-99)
Digital zone
Element status

CC-11 (Pad V5.25) POINT DESCRIPTION
Extinguish section
Multi logic zone (exting)
Programmable control zone
Interhorn element
Externhorn element
Remote transmission “other” element
Alarmhorn element
Alarmhorn element
Extinguish subsystem
Lon interface 1
Lon interface 2
Remote control unit

CZ12/CS4 (Pad V5.20) POINT DESCRIPTION
Gateway_link_status
General_fault
Power_fault
Fault_xmit
Intrusion_alarm_tx
Line_sabotage
Panel_sabotage
Organization
Part_off
Addresses [zones]
Groups [sections]
Duress_alarm
Time_program
Address_lock [zones]

CS4 version 6a (Pad V5.25) POINT DESCRIPTION
Addresses [zones]
Address_lock [zones]
CS4 version 7 (Pad V5.25) POINT DESCRIPTION
Addresses [zones]
Group [section]
Time program
Address_lock [zones]

CS4-40 version 6a and 7 (Pad V5.25) POINT DESCRIPTION
Addresses [zones]
Address [zone] lock
CT411 power supply
Address [zone] masking

CC60 POINT DESCRIPTION
Gateway link status
Power supply
Control sector faults
Terminal 1
Terminal 2
Gas sector organization
Gas sector faults
Gas sector excluded
General alarm
Alarm remote transmission
Gas zone
Gas detectors
Tech sector faults
Tech out

CZ10 SUPPORTED COMMANDS
Status request
Reset *
Acknowledgement (fault and alarm)
Night switch-over
Day switch-over
Include a fire group
Exclude a fire group
Include a technical group
Exclude a technical group
Activate digital output on
Deactivate digital output off

CC-11 SUPPORTED COMMANDS
Status request
General reset
General acknowledge
Section acknowledge
Section reset
Exclude all zones of a section
Include all zones of a section
Night switch over
Day switch over
Control element on
Control element off
Exclude zone
Include zone

CZ12 / CS4 /CS4-40 SUPPORTED COMMANDS
Status request
Reset
Acknowledgement
Night switch over
Day switch over
Include group / section
Exclude group / section

CC60 SUPPORTED COMMANDS
Status request
Reset
Acknowledgement
Night switch over
Day switch over
Include gas detector
Exclude gas detector
Technical output on
Technical output off

3 Security control panel points managed by FSS

3.1 Supported devices

The FHI Pad only supports the following Cerberus control panels:

CZ10 (fire and technological sub-sector)
CS11
CZ12
CS4
CS4-40
CC60

Only the most meaningful subset of telegrams and commands of these subsystems is supported, as specified in the following paragraphs. The security and safety subsystems listed above communicate with the gateway using the Cerban Protocol.
The FHI Pad translates Cerban Protocol Telegrams into Standard Protocol Messages, in order to send information coming from control panel to the FSS device.
The FHI Pad also translates the Standard Protocol Commands into Cerban Protocol Commands, in order to send commands coming from FSS device to the control panels.

3.2 FSS security/safety point modeling

Each security control panel will be represented in the FSS by a group of contiguous blocks. Each block represents an information item of the control panel.
The security/safety control panel detects a change of status of **points**, and it sends to the Gateway a message about the change of status. The Gateway sends the message to the FHI Pad that converts the point into a block value, according to the table shown in Par. from 3.2.1 to 3.2.4.
The block value that represents the point is transmitted from the FHI Pad to the FSS, where it is treated according to the FSS configuration.

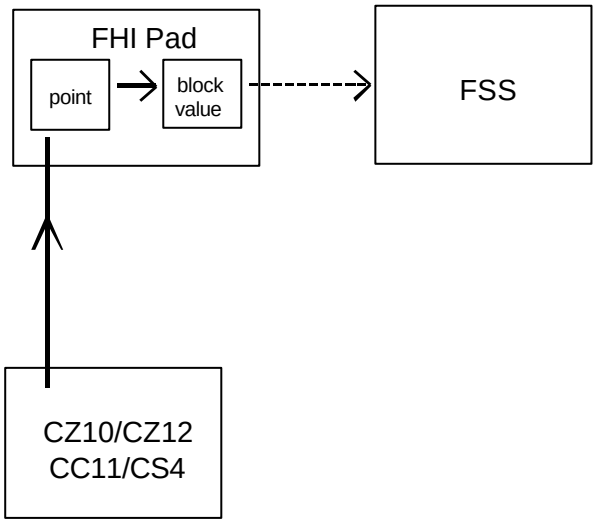

Fig. 7

3.2.1 CZ10 points representation

The following table presents the CZ10 image in terms of FSS blocks and the specific values representing the different states.

Point number	Point description	Status	Block value	Treatment flag
1	Gateway_link_status	normal	5	0
		fault	0	2
		net fault	2	2
3	General_fault	normal	5	0
		fault	0	2
5	Power_fault	normal	5	0
		fault	0	2
		battery	7	2
6	Fault_xmit	off	5	0
		on	4	1
7	Fire_alarm_xmit	off	5	0
		on	4	1
8	Fire_alarm	normal	5	0
		loc.al.	6	2
		gen.al.	7	2
10	Fire_organization	night	5	0
		day	4	0
11	Fire_part_off	normal	5	0
		exclud.	6	1
16-111	Fire\Tech_group	normal	5	0
		exclud.	4	1
		fault	0	2
		test	3	1
		alarm	7	2
		testalarm	6	2
264-1463	Line_elements	normal	5	0
		active	6	2
		fault	2	2
168-263	Technical_digital_outputs	off	5	0
		on	6	2

Block value

This is the value that the block assumes when it is in the status listed in the corresponding column.

All integer values have been chosen in order to be processed by the FSS. The FSS template recognises all individual integer values in the range 0-8.

Status

It is the description of the state for security points representation. All the statuses not explicitly mentioned are not treated at all.

Treatment flag

It specifies the treatment flag used in the Standard Protocol Messages.

For each CZ10, only those blocks which are required must be configured.

3.2.2 CZ10 supported commands

The following table presents all CZ10 commands available to an FSS user. Commands do not require any configuration on FSS.

Command Description	Command number	Command parameter
Status request	0	block #
Reset	2	block # (*)
Acknowledgement (fault and alarm)	1	block # (*)
Night switch-over	7	block # (*)
Day switch-over	8	block # (*)
Include a fire group	9	block #
Exclude a fire group	10	block #
Include a technical group	17	block #
Exclude a technical group	18	block #
Activate digital output on	20	block #, output # (1-96)
Deactivate digital output off	21	block #, output # (1-96)

Command number

It is the relative command number for CZ10 (Please refer to LMSmodular Configuration Reference for a complete command list).

Command parameter

It is an optional command parameter. It could be the block corresponding to the group number to be included or excluded (commands no. 9, 10, 17 and 18) or the block corresponding to the number of a technical output to be set ON or OFF (commands no. 21 and 20)

(*) These general commands require (as parameter) one of the block numbers (any) which belongs to the control unit.

At FSS level you must not use an automatic acknowledge command, because this forbids the remote transmission alarm on CZ10, a condition that could be potentially dangerous.

3.2.3 CS-11 points representation

CK 11 Gateway

The CK11 gateway is an Cerban/Cerloop interface for CS11 systems. Up to four CC11 control units can be networked on a C-BUS with a common CK11 gateway. The picture below illustrates the overall CS11 system architecture.

In the Cerban/Cerloop application protocol, the CK11 and the four CC11s assume a separate 3-digit address and have a logically separated treatment. Therefore, individual messages for fault and presence reports are foreseen for each of the connected CC11 units as well as for the CK11 itself.

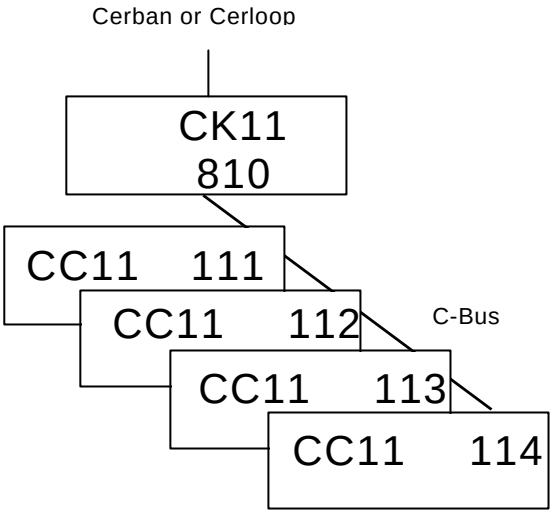

Fig. 8

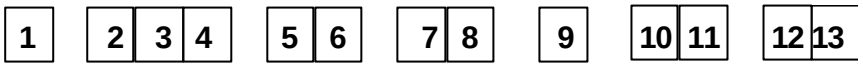

Fig. 9 Message Format

Each box is a byte and all data are ASCII characters. The meaning of each byte is

1	Telegram type (sector): "W" = Fire ; "P" = Technological ; "Z" = Control ; "K" = Communication with GW (generated by GW)
2,3,4	Local address
5,6	Identification block 1 (group)
7,8	Identification block 2 (address)
9	Block direction: "N" = Status without acknowledgement "U" = Not acknowledged event "Q" = Acknowledged event "R" = Command
10,11	Data block A
12,13	Data block B

The following table presents the CS-11 image in terms of blocks and the specific values representing the different statuses.

Block value

It is the value that the block assumes when it is in the status listed on the corresponding column.

All integer values have been chosen in order to be processed by the FSS. The FSS template recognises all individual integer values in the range 0-8.

Status

It is the description of the state for security points representation.

All the statuses not explicitly mentioned are not treated at all.

Treatment flag

It specifies the treatment flag used in the Standard Protocol Messages.

CC-11 points representation

The version 5.20 supports the following structure numbers (EP2/A) with the related messages:

Structure number	Point description	Status	Block value	Treatment flag
	Gateway link status	normal	5	0
		fault	0	2
		partdiscon	2	2
1201	Control unit	normal	5	0
		fault	0	2
1340	Power supplies (1-16)	normal	5	0
		fault	0	2
		battery	7	2
1301 1310 1320	Function unit alarm/status (1-16)	normal	5	0
		fault	0	2
		alarm	7	2
1562	Remote transmission alarms (1-8)	inactive	5	0
		active	6	1
1562	Remote transmission faults (1-8)	inactive	5	0
		active	6	1
1801	Area general alarm (1-16)	normal	5	0
		gen.al	7	2
1801	Area fire organisation (1-16)	night	5	0
		day	4	0
1601 1602 1605	Detection zone status	normal	5	0
		excluded	4	1
		warning	0	2
		test	3	1
		alarm auto	7	2
		not ready	2	2
		alarm man.	7	2
1654 1651	Control zone status	normal	5	0
		active	6	0
		off	4	0
1525	Detection element (input)	normal	5	0
		active	6	0
		fault	3	2
		excluded	4	1
1551	Control element (output) without feedback	normal	5	0
		active	6	0
		fault	3	2
		excluded	4	1
1552	Control element (output) with feed-back	normal	5	0
		active	6	0
		fault	3	2
		excluded	4	1
1501 1502 1510 1520 1503	Element status	normal	5	0
		active	6	0
		fault	0	2
		drift	1	2
		excluded	4	1
		testalarm	3	2

The pad version 5.21 supports the additional structure numbers (EP3/A):

Structure number	Point description	Status	Block value	Treatment flag
1201	control unit	normal	5	0
		alarm	7	2
1202	remote terminal	normal	5	0
		fault	0	2
1302 1303	line interface (1-16)	normal	5	0
		fault	0	2
1563	remote transmission device (1-8)	inactive	5	0
		disabled	6	1
		fault	0	2
1210	CI11 fire unit	normal	5	0
		alarm	7	2
1210	CI11 control unit	normal	5	0
		fault	0	2
1801	fire area (1-16)	normal	5	0
		excluded	4	1
		fault	0	2
1701	fire section (1-99)	normal	5	0
		alarm	7	2
1610	digital zone	normal	5	0
		excluded	4	1
		test	3	1
		alarm auto	7	2
		not ready	2	2
1508 1511 1512 1521	element status	normal	5	0
		active	6	0
		fault	0	2
		drift	1	2
		excluded	4	1
		testalarm	3	2

The pad version 5.25 supports the additional structure numbers (EP4):

Structure number	Point description	Status	Block value	Treatment flag
1702	extinguish section	normal	5	0
		alarm	7	2
		active	6	1
		disable	4	1
		fault	0	2
1602	multi logic zone (exting)	normal	5	0
		excluded	4	1
		test	3	1
		warning	0	2
		alarm	7	2
		not ready	2	2
1656	programmable control zone	normal	5	0
		active	6	0
		excluded	4	1
1560	internhorn element	normal	5	0
		active	6	0
		fault	0	2
		excluded	4	1
1561	externhorn element	normal	5	0
		active	6	0
		fault	0	2
		excluded	4	1
1562	remote transmission other Element	normal	5	0
		active	6	0
		fault	0	2
		excluded	4	1
1564	alarmhorn element	normal	5	0
		active	6	0
		fault	0	2
		excluded	4	1
1565	alarmhorn element	normal	5	0
		active	6	0
		fault	0	2
		excluded	4	1
1395	extinguish subsystem	normal	5	0
		fault	0	2
1396	lon interface 1	normal	5	0
		fault	0	2
1397	lon interface 2	normal	5	0
		fault	0	2
1211	remote control unit	normal	5	0
		fault	0	2

For each CC-11, only the needed blocks must be configured.

3.2.4 CS-11 supported commands

The following table presents all CS11 commands available to an FSS user. Commands do not require any configuration on the FSS.

Command Description	Command number	Command parameter
Status request	0	block #
General reset	2	block # (*)
General acknowledge	1	block #
Section acknowledge	1	block #
Section reset	2	block #
Exclude all zones of a section	40	block #
Include all zones of a section	41	block #
Night switch over	21	block #
Day switch over	22	block #
Control element on	52	block #
Control element off	53	block #
Exclude zone	40	block #
Include zone	41	Block #

Command number

It is the relative command number for CS11 (Please refer to LMSmodular Configuration Manual for a complete command list).

Command parameter

It is a mandatory command parameter. It is the block number which corresponds to the involved ADF number.

(*) This general command requires (as parameter) one of the block numbers (any) which belongs to the control unit.

At FSS level you must not use an automatic acknowledge command, because this forbids the remote transmission alarm on CS11, a condition that could be potentially dangerous.

3.2.5 CZ12, CS4, CS4-40 points representation

The following table presents the CZ12, CS4 and CS4-40 image in terms of FSS blocks and the specific values representing the different states.

Block value

It is the value that the block assumes when it is in the status listed on the corresponding column.

All integer values have been chosen in order to be processed by the FSS. The FSS template recognises all individual integer values in the range 0-8.

Status

It is the description of the state for security points representation. All the statuses not explicitly mentioned are not treated at all.

Treatment flag

It specifies the treatment flag used in the Standard Protocol Messages

According to the LMS organisation, the CZ12, CS4 and CS4-40 are managed with the following subsystem subtype:

- 0 CZ12 with Cerban protocol (decimal, 96 zones)
- 1 CZ12 V5 with Cerban protocol (decimal, 96 lock zones)
- 2 CS4 V6 with Cerban protocol (decimal, 50 users)
- 3 CS4 V6a and v7 with Cerban/hex protocol (hexadecimal, 128 zones and lock zones)
- 4 CS4-40 V6a with Cerban/hex protocol (hexadecimal, 254 zones, lock zones, masking zones)
- 5 CS4-40 V7 and V8 with Cerban/hex protocol (hexadecimal, 512 zones, lock zones, masking zones)

For CZ12 version 5 and CS4 version 6, the pad version 5.20 supports the following points with the related messages:

Point number	Point description	Status	Block value	Treatment flag
1	Gateway_link_status	normal	5	0
		fault	0	2
		fault net	2	2
4	General_fault	normal	5	0
		fault	0	2
5	Power_fault	normal	5	0
		fault	0	2
		battery	7	2
6	Fault_xmit	off	5	0
		on	1	1
		delay	2	1
7	Intrusion_alarm_tx	normal	5	0
		on	4	1
		delay	6	1
115	Line_sabotage	normal	5	0
		excluded	4	1
		sabotage	0	2
116	Panel_sabotage	normal	5	0
		excluded	4	1
		sabotage	0	2
119	Organisation	night	5	0
		day	4	0
		no ready	1	1
117	Part_off	normal	5	0
		excluded	1	1
15-110	Addresses [zones]	normal	5	0
		excluded	4	1
		test	3	1
#96		no ready	2	2
		sabotage	0	2
		al.+ sab	1	2
		testalarm	6	2
		alarm	7	2
121-184	Groups [sections]	normal	5	0
#64		excluded	4	1
111	Duress_Alarm	normal	5	0
		alarm	4	2
187-194	Time_Program	on	4	2
#8		off	5	0
221-316	Address_lock [zones]	normal	5	0
#96		on	4	1

For CS4 version 6a , the pad version 5.25 supports the subtypes 3 and the following points with the related messages:

Point number	Point description	Status	Block value	Treatment flag
358-389 #128	Addresses [zones]	normal	5	0
		excluded	4	1
		test	3	1
		no ready	2	2
		sabotage	0	2
		al. + sab.	1	2
		testalarm	6	2
		alarm	7	2
390-421 #128	Address [zone] lock	normal	5	0
		on	4	1

For CS4 version 7, the pad version 5.25 supports the subtypes 3 and the following points with the related messages:

Point number	Point description	Status	Block value	Treatment flag
459-584 #254	Addresses [zones]	normal	5	0
		excluded	4	1
		test	3	1
		no ready	2	2
		sabotage	0	2
		al. + sab.	1	2
		testalarm	6	2
		alarm	7	2
423-457 #99	Group [section]	normal	5	0
		excluded	4	1
422 #9	Time program	on	4	2
		off	5	0
585-710 #254	Address [zone] lock	normal	5	0
		on	4	1

For CS4-40 version 6a, 7, and 8, the pad version 5.25 supports the subtypes 4 and 5 and the following points with the related messages:

Point number	Point description	Status	Block value	Treatment flag
714-715 974-1229 #512	addresses [zones]	normal	5	0
		excluded	4	1
		test	3	1
		no ready	2	2
		sabotage	0	2
		al. + sab.	1	2
		testalarm	6	2
		alarm	7	2
716-717 1230-1485 #512	address [zone] lock supervision	normal	5	0
		on	4	1
713	ct411 power supply	normal	5	0
		fault	0	2
		battery	1	2
718-973 1486-1741 #512	address [zone] masking	normal	5	0
		temper	7	1

For each CZ12, CS4 and CS4-40 only the required blocks must be configured.
The zones become up to 512 according to the LMSmodular CS4-40 point list, the CS4-40 control unit requires two new control unit subtypes: 4 and 5.

In order to discriminate the range for the Zones, the following rule applies to the two identification data block field (1 and 2):

Identification data block	Zona range
0401-04FA	1-250
0501-05FA	251-500
0601-06FA	501-750
0701-07FA	751-1000

Identification data block	Zona range
0801-08FA	1-250
0901-09FA	251-500
0A01-0AFA	501-750
0B01-0BFA	751-1000

Identification data block	Zona range
0C01-0CFA	1-250
0D01-0DFA	251-500
0E01-0EFA	501-750
0F01-0FFA	751-1000

The ranges are defined up to 1000 zones (although the real treatment regards 512 zones only).

For Zones, Section, Time program, ZoneLock and ZoneMasking the following correspondences are valid:

LMS point number	iten range
15-110	Zones 1-96
121-184	Section 1-64
187-194	Time program 1-8
221-316	ZoneLock 1-96
358-389	Zone 97-128
390-421	ZoneLock 97-198
422	Time program 9
423-457	Section 65-99
459-584	Zone 129-254
585-710	ZoneLock 129-254
714-715	Zone 255-256
716-717	ZoneLock 255-256
718-973	ZoneMas 1-256
974-1229	Zone 257-512
1230-1485	ZoneLock 257-512
1486-1741	ZoneMas 257-512

3.2.6 CZ12, CS4, CS4-40 supported commands

The following table presents all of the CZ12, CS4, and CS4-40 commands available. Commands do not require any configuration on FSS.

Command description	Command number	Command parameter
Status request	0	block #
Reset*	2	block # (*)
Acknowledgement	1	block #
Night switch over	29	block #
Day switch over	30	block #
Include group	24	block #
Exclude group	25	block #

Command number

It is the relative command number for CZ12, CS4 and CS4-40 (Please refer to LMSmodular Configuration Reference for a complete command list).

Command parameter

It is an optional command parameter. This parameter is the block corresponding the group number to be included/excluded for command no. 24 and 25.

(*) This general command requires (as parameter) one of the block numbers (any) which belongs to the control unit.

At FSS level you must not use an automatic acknowledge command because this forbids the remote transmission alarm on CZ12, CS4 and CS4-40, a condition that could be potentially dangerous.

3.2.7 CC60 points representation

The following table presents the CC60 image in terms of blocks and the specific values representing the different statuses.

Point number	Point description	Status	Block value	Treatment flag
1	Gateway link status	normal	5	0
		fault	0	2
		PartDisct	2	2
3	Power supply	normal	5	0
		battery	7	2
		fault	0	2
4	Control sector faults	normal	5	0
		fault	0	2
5	Terminal 1	normal	5	0
		fault	0	2
6	Terminal 2	normal	5	0
		fault	0	2
8	Gas organization	night	5	0
		day	4	0
9	Gas sector faults	normal	5	0
		fault	0	2
10	Gas sector excluded	normal	5	0
		anomaly	6	1
11	General alarm	normal	5	0
		loc. alarm	6	2
		alarm	7	2
12	Alarm remote TX	inactive	5	0
		active	4	1
13-68	Gas zone	normal	5	0
		warning	4	1
		preAlarm	6	2
		alarm	7	2
69-124	Gas detectors	normal	5	0
		excluded	4	1
		test	3	1
		fault	0	2
		preAlarm	6	2
		alarm	7	2
125	Tech sector faults	normal	5	0
		fault	0	1
126-253	Tech out	normal	5	0
		fault	0	2
		active	6	2

3.2.8 CC60 supported commands

The following table presents all the CC60 commands available:

Command description	Command number	Command parameter
Status request	0	block #
Reset *	2	block # (*)
Acknowledge	1	block #
Night switch over	6	block #
Day switch over	7	block #
Include gas detector	27	block #
Exclude gas detector	26	block #
Technical output on	30	block #
Technical output off	31	block #

(*) Before version 5.25 the Reset command is available only for the FHI pad, since version 5.25, the Reset command is available for both Nise and FHI pad

3.3 FSS security control panel image

FHI Pad keeps an image of all the security points to be transmitted to the FSS.
A table contains the correlation between the security/safety point, as treated by the LMS, and the FSS block representation.
A special table is provided to guarantee this correlation. The table converts the Cerban telegrams into a standard message, whose format is reported here:

	Standard message	FSS level
byte	0	00H
	1	year
	2	month
	3	day
	4	hour
	5	minute
	6	seconds
	7-8	0000H
	9-10	block number
	11	treatment flag
	12-15	point value

3.4 Image initialisation

In order to get a new image of the control panel after a line down condition of the control panel (including start-up) the FHI Pad will perform the following operations:

- it sets all the point values to 5 (normal or default value);
- it sends the specific status requests.

The status request will generate the variations with respect to normal that will permit to up-date the control panel image.
The new image will subsequently be sent to the FSS.

3.5 Security/safety commands treatment.

The integrated system manages the following commands

- CZ10 reset command
- CZ10 acknowledge command
- CZ10 night switch-over
- CZ10 day switch-over
- include a CZ10 fire group
- exclude a CZ10 fire group
- include a CZ10 technical group
- exclude a CZ10 technical group
- set on a CZ10 technical output
- set off a CZ10 technical output
- CS11 reset command
- CS11 acknowledge command
- CS11 night switch over
- CS11 day switch over
- set on a CS11 control element
- set off a CS11 control element
- include a CS11 zone
- exclude a CS11 zone
- CZ12 reset command
- CZ12 acknowledge command
- CZ12 night switch-over
- CZ12 day switch-over
- CZ12 include group
- CZ12 exclude group
- CC60 reset command
- CC60 acknowledge command
- CC60 night switch over
- CC60 day switch over
- include CC60 gas detector
- exclude CC60 gas detector
- set on a CC60 technical output
- set off a CC60 technical output

The FSS issues these commands as Standard Protocol Commands, according to the following format:

	Standard command	**FSS level**
byte	0	80H
	1-2	0000H
	3-4	command number
	5-6	block number
	7-8	parameter number (group number)
	9-10	0000H
	11-12	0000H
	13-14	0000H
	15	00H

If the command is a global one (e.g. acknowledge) the FSS must specify any block number that belongs to the control panel. The FSS system manager that configures the package should take care of it.

4 Technological control panel points managed by LMS

4.1 Supported technological plant item

The integrated systems support any technological plant item that complies with the FSS requirements and communicates with FHI Pad using the Cerberus Dati Standard Protocol.

4.2 LMS technological point modeling

The LMS workstation accesses a subset of the data points configured in the FSS system through the FHI Pad interface. This subset of points will be modeled for LMS by the FHI_PAD in order to emulate a Cerberus Dati CMX cluster.
CMX cluster support is available with LMS V2.4 and later.

4.2.1 Digital points

Technological points are modeled in the LMS by emulation of a cluster of CMXs (Cerberus Dati Multiplexer) performed by FHI Pad.
CMX communicates using CDSF (Cerberus Dati Standard Format) as application level.
The technological points are grouped together according to the CMX data structure. Each CMX cluster is composed of up to 32 CMX units. Each CMX unit has 24 digital points according to the following table:

Subtype	Description
4	24 digital input
5	16 digital input and 8 digital output
6	Reserved to cluster unit 0 (for compatibility with NISE_Pad)
7	24 digital output

Each combination corresponds to a subsystem subtype for LMSmodular configuration.

The following tables present the technological points allocation on the CMX cluster structure:
CMX # 1, First unit of the cluster, local address 00H, subtype 6

# Point	Description
01	Link status with FSS
02	Subsystem scan status
03	FSS general status
04	reserved
05	reserved
06	reserved
07	reserved
..	.....
27	reserved

The first unit in the cluster must be reserved for diagnostic puposes.
CMX # 2 - 32, local address 01H - 1FH, subtype 4,5,7

# Point	Description
01	Link status with FSS
02	Subsystem scan status
03	Not used
04	1st digital input/output
05	2nd digital input/output
06	3rd digital input/output
07	4th digital input/output
..	.....
27	24th digital input/output

Points 1-3 of unit 1 are used for general diagnostics information.

Link status with FSS: It represents the status of the FHI Pad - FSS link, monitored by the FHI Pad.

0 = Normal
1 = Down
2 = Unknown (this status is entered when the link between LMSmodular and Gateway is down)

Subsystem Scan status: Indicates the ON-OFF scan status for the subsystem at LMSmodular level. This point is therefore managed by LMSmodular station only.

0 = ON scan
1 = OFF scan

FSS general status: Spare, reserved for FSS diagnostics on LMS workstation.

0 = Normal
1 = Some problem is pending

Any other point can assume a digital value, in the range:

0 = Normal
1 = Alarm not acknowledged
2 = Alarm acknowledged
3 = Alarm reset required
4 = Reserved for compatibility with NISE Pad: Not-existing
5 = Reserved for compatibility with NISE Pad: Not available
6 = Reserved for compatibility with NISE Pad: Disabled
7 = High alarm
8 = Low alarm
9 = Auto-off
10 = Auto-on
11 = Manual off
12 = Manual on

Value 0 always represents Normal (default) status.
Not existing means the block is not configured on FSS.
Not available means the FSS containing the correspondent block is off-line.
Points 1-2 are typical of LMSmodular information, they have no corresponding FSS block.
Point 3 has a corresponding FSS block.
Points 4-27 could have corresponding blocks.

4.3 Analog points

The analog point representation will be implemented in future versions of LMSmodular.

4.4 Command representation

The following table presents the list of CMX commands (telegram description and meaning) supported by the FHI Pad. Commands are transmitted to the FHI Pad in CDSF.

Command number.	I/O type	Address number	Par. 01	Par. 02	Par. 03	Par. 04	Par. 05	Done Ope.	Done Auto	Description
00	0	add	0	0	0	0	0	no	yes	Unit Status req.
00	0	add	1	val0	val1	val2	0	yes	yes	Modify date-time
01										Reserved
02										Reserved
03	0	add	# pnt	0	0	0	0	yes	no	Deact. dig.manual
04	0	add	# pnt	0	0	0	0	yes	no	Activ. dig.manual
05										Reserved
06										Reserved
07										Reserved
08										Reserved
09										Reserved
10										Reserved
11	0	add	# pnt	0	0	0	0	yes	no	Set to auto
12										Reserved
13	0	add	# pnt	0	0	0	0	yes	no	Ack dig. block
14	1	add	# pnt	0	0	0	0	yes	no	Ack ana. block
15	0	add	# pnt	0	0	0	0	yes	no	Reset dig. block
16	1	add	# pnt	0	0	0	0	yes	no	Reset ana. block
17	1	add	# pnt	val.	val.	0	0	yes	no	Modify analog

add (Cluster) local address: range 00H-13H.
val*x* where *x* could be 0, 1 or 2. They are the values of data-time.
pnt number of pointer; range is 3-24.
val analog value (IEEE format is used).
I/O type type of I/O involved
0 = digital command.
1 = analog command.
Ope command should be issued by the operator.
Auto command should be issued by LMS automatically.
In the first version, analog blocks are not yet treated.

	Standard command	LMS level	FSS level
byte	0	80H	80H
	1-2	Local address	0000H
	3-4	command number	command number
	5-6	point number (1st parameter)	block number
	7-8	2nd parameter	parameter number (group number)
	9-10		
	11-12		
	13-14		
	15		

4.5 FHI Pad Technological points image

FHI Pad maintains an image of all technological points to be transmitted to the LMS using a technological point table. This table contains the correlation between the FSS block representation and the CMX points that represent technological points inside LMS.
When a change of status occurs in the technological field devices, the FSS issues a Standard Protocol message to the FHI Pad.
The FHI Pad firmware looks at the technological point table and accesses it through the Block number values.
The table is dimensioned for the maximum number of technological points declared in "Configuration limits" chapter. The table holds the image of both input points (DI/AI) and output blocks (DO/AO).
The technological point table links the technological block and the virtual LMS point that it represents. The point status is changed according to the CDSF message received and this change of status is notified to the LMS. In order to do that, FHI Pad will use the Standard Message, according to the following message structure:

	Standard message	**LMS level**	**FSS level**
byte	0	00H	00H
	1	year	year
	2	month	month
	3	day	day
	4	hour	hour
	5	minute	minute
	6	seconds	seconds
	7-8	local address	0000H
	9-10	point number	block number
	11	treatment flag	treatment flag
	12-15	point value	point value

4.6 Image initialisation

If the connection with FSS is interrupted, i.e. if the FHI Pad detects a line down status, FHI Pad sends a message to LMS to set point # 1 of all the CMX units to 1 (Connection to the gateway down).
The FHI Pad will send a message to the LMS to set point #1 to 0 (i.e. connection to the gateway on) only after the first scan cycle is totally completed. The line up condition will cause a status request to be generated by the LMS, which will be transmitted via the FHI Pad to the FSS. It is up to FSS to answer with all the point values which are different from the default values.

5 Special commands from FSS

The FSS can set the date and time on the FHI Pad using the special command 0,1. The structure of this command is shown in the table below.

Byte	Name	Content	Format
0	Type	80	hexadecimal
1	Unused	FF	hexadecimal
2		FF	hexadecimal
3	Command number	00	hexadecimal
4		00	hexadecimal
5	Block number	01	hexadecimal
6		00	hexadecimal
7	Date (year)	YY	BCD
8	Date (month)	MM	BCD
9	Date (day)	DD	BCD
10	Time (hour)	hh	BCD
11	Time (minutes)	mm	BCD
12	Time (seconds)	ss	BCD
13	Unused	00	hexadecimal
14	Unused	00	hexadecimal
15	Unused	00	hexadecimal

6 Interactions

Two kinds of interaction are available
- from a control panel (mainly Cerban Subsystem) to the FSS.
- from the FSS to a control panel (mainly Cerban Subsystem).

6.1 From a control panel to the FSS.

This feature is managed by the Subsystem Pads installed on the Gateway to which the control panel that triggers the interaction is connected.
On these boards both firmware and a management table are present and the interaction is decided at Subsystem pad level. A message is issued to the FHI Pad and on receipt of it the FHI Pad sends a command to the FSS using the Cerberus Standard protocol format.

6.2 From the FSS to a control panel

In these interactions the FHI Pad acts just as a translator.
The FSS issues a command to the FHI Pad using the Cerberus Standard protocol. Upon receipt the FHI Pad translates it into the corresponding command in Cerban protocol format.
These commands deal mainly with the Technical Digital Outputs of fire control panel (CZ10).

7 Configuration notes

The FHI Pad deals with a subset of blocks configured on the FSS system.
NISE_CNF is the software tool used to configure FHI Pad board EPROMs.
The configurator is used to generate the following tables to be stored on EPROM or downloaded to the Pad:

- Digital Technological Point Table (used by LMS)
- Security Point Table (used by FSS)
- Control FHI Pad existence information (used by FSS)
- Other minor tables

All the security blocks in the FSS should belong to a continuous range within the FSS, in order to simplify the configuration procedure. In this case you can use the configurator's range option, that greatly speeds up the configuration process.

8 Appendix A - Security points table

LMS				
Control panel Type:				
Subsystem Pad Number:				
Control panel Local Address				
Control panel Subtype:				
Serial line Number			FSS	
N.	Point Number	Point Description	Point Type	Block num.
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

Control Panel Type	could be either CZ10 or CZ12 or CS11 or CS4-40 or CC60
Subsystem Pad number	please refer to LMS Configuration Manual
Control Panel local address	please refer to LMS Configuration Manual
Control Panel Subtype	please refer to LMS Configuration Manual (Appendix A) for a list of subtypes available
Serial Line number	please refer to LMS Configuration Manual
Point number	please refer to LMS Configuration Manual
Point Description	please refer to LMS Configuration Manual
Point Type	for a CZ10: 0=Fire Sector; 1=Tech. Sector for a CZ12/CS4/CSS-40 zones: Group/section number; for CS-11 and CC-60 is reserved and should be left to zero
Block number	0-2047

9 Appendix B - Technological points table

	LMS INFORMATION
Local address (cluster)	:
CMX Subtype	:
Subsystem description	:

	LMS		FSS	
N.	Point Number		Point Description	Block Number
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				

Local address (cluster)	0-31
CMX Subtype	4 : 24 digital inputs 5 : 16 digital inputs 8 : 8 digital output 6 : diagnostic 7 : 24 digital output
Subsystem Description	Name of the subsystem to which technological points are associated
Point Number	4-27
Point Description	FSS description of block
Block Number	0 - 2047

10 Appendix C - Interaction table

INTERACTIONS	
System	:
Gateway #	:
Subsystem/FHI Pad - Slot #	:

SOURCE SUBSYSTEM				Source Event	Interaction
Row#	Description	Number	Type		Program #
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

REACTIONS	
System	:
Gateway #	:
Subsystem/FHI Pad - Slot #	:

Row#	Interaction Program #		Comments:	
	Target subsystem			Command
	Description	#	Type	
1				
2				
3				
4				
5				
6				
7				

Row#	Interaction Program #		Comments:	
	Target subsystem			Command
	Description	#	Type	
1				
2				
3				
4				
5				
6				
7				

Each row can deal with a different subsystem. The target subsystem number must be in the range 0 - 16 even on GW-20.20 because the FHI Pad takes one slot, i.e. the place of four lines.

Keyword index

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