LIEBHERR

Diagnostics

LTM, LTF, LG, LTR

Operating instructions

BAL-No.: 99900-07-02

Pages: 265

Werk-Number	
Date	

The operating manual is part of the crane!

It must always be carried and be ready for use!

Comply with all traffic regulations and specifications for crane operation!

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Foreword

General

This crane has been built according to the present level of technology and recognized safety technical regulations. Despite that, dangers to body and life for the user and/or third persons or damage to the crane and /or other material assets can occur.
This crane may only be used in flawless technical condition and according to its mission as well as with constant awareness of safety and dangers. Any problems, which could affect safety must be fixed immediately.
Modifications on the crane may only be made with written approval by Liebherr-Werk Ehingen GmbH.

Operating instructions

These operating instructions are intended to put you in a position to operate the crane safely and utilize the reliable usage options that it provides. The instructions also provide information about the function of important components and systems.
Certain expressions are used in these operating instructions. In order to avoid misunderstandings, the same expressions should always be used.
These operating instructions have been translated to be best of one's knowledge. Liebherr-Werk Ehingen GmbH assumes no liability for translation errors. The German version of the operating instructions is solely applicable for factual accuracy. If you find any errors or if any misunderstandings arise when reading these operating instructions, please contact Liebherr-Werk Ehingen GmbH immediately.

Danger!
Risk of accidents if crane is not operated correctly!
! Only qualified and trained expert personnel are permitted to work on this crane.

The operating instructions and on-site regulations and specifications (such as accident prevention regulations) must be followed.
Using these operating instructions:
– **makes it easier** to become familiar with the crane
– **avoids** problems due to improper operation

Observing these operating instructions:
– **increases** reliability in use
– **extends** the service life of your crane
– **reduces** repair costs and downtime

Always keep these operating instructions handy in the driver's or crane cab.
The operating instructions belong with the crane!
Only operate the crane if you are well familiarized with the equipment, and always follow these operating instructions.
If you have received additional information about the crane from us, such as technical information bulletins, then this information must also be followed and kept with the operating instructions.
If there is anything in the operating instructions or the individual chapters that you do not understand, please contact us before starting the relevant work.

All accident prevention guidelines, operating instructions, etc. are based on destined use of the crane.

Destined use

The destined use of the crane consists solely in vertical lifting and lowering of free and non-adhered loads, whose weight and center of gravity are known.
To do so, a hook or hook block approved by Liebherr must be reeved on the hoist rope and it may only be operated within the permissible crane configurations.
Driving with the crane, with or without an attached load is only permissible if a corresponding driving or load chart is available. The crane configurations intended for it and the safety conditions must be observed according to the corresponding operating instructions.
Any other use or any other exceeding utilization is **not** destined use.
Part of destined use is also adherence of required safety regulations, conditions, preconditions, crane configurations and working steps as noted in the crane documentation (operating instructions, load chart, job planer).
The manufacturer is **not** liable for damages, which are caused by non-destined use or improper use of the crane. Any associated risk it is carried solely by the owner, the operator and the user of the crane.

Non-destined use

Non -destined use is:
- Working outside the permissible crane configurations according to the load chart
- Working outside the permissible projection radii and slewing ranges according to the load chart
- Selecting load values, which do not correspond to the actual crane configuration
- Selecting LMB-Codes, which do not match the actual crane configuration
- Working with bypassed load moment limiter or bypassed hoist limit switch
- Increasing the projection radius of the lifted load after a LMB shut off, for example by diagonally pulling the load
- Using the support pressure display as a safety function against tipping over
- Using equipment or attachment parts which are not approved for the crane
- Using the crane at sports and recreational events, especially for 'Bungee' jumps
- Driving on a public road in non-permissible driving condition (axle load, dimension)
- Driving with the equipment in place in a non-permissible driving condition
- Pushing, pulling or lifting loads with the leveling regulation, the sliding beams or the support cylinders
- Pushing, pulling or lifting loads by actuating the slewing gear, the luffing gear or the telescoping gear
- Ripping stuck objects loose with the crane
- Utilizing the crane for a longer period of time for material handling tasks
- Releasing the crane suddenly (grapple or dumping operation)
- Putting the crane into service when the weight of the load, which is suspended load on the crane, is changed, for example by filling a container suspended on the load hook

The crane may **not** be used for:
- attaching a stuck load for which the weight and center of gravity are not known and which has been released first, for example with a cutting torch
- letting persons drive along outside the driver's cab
- transporting personnel in the crane cab while driving
- transporting personnel with the lifting equipment and on the load
- transporting personnel with containers (cherry pickers), if no written approval of the corresponding job safety board has been issued
- transporting loads on the chassis
- two hook operation without auxiliary equipment
- extended material handling operation

The operating instructions must be read and used by all persons who are involved in use, operation, assembly and maintenance of the crane.

Warnings

The following terms that are used in these operating instructions “Note”, “Caution”, “Warning” and “Danger” are intended to point out certain **important rules of conduct** to all persons who work with the crane.

Note:
The term “Note” is used to draw attention to certain matters.

Caution:
The term “Caution” is used to provide a warning about potential damage to property or minor personal injury.

Warning:
The term “Warning” is used to provide a warning about potentially serious personal injury.

Danger:
The term “Danger” is use to provide a warning about life-threatening hazards.

Safety equipment

Special attention must be paid to the safety equipment built into the crane. The functionality of the safety equipment must be monitored at all times. The crane must not be operated if the safety equipment is not working or not working correctly.
Your motto must always be:
!Safety first!
The crane has been built in accordance with the applicable crane operation and driving regulations and has been approved by the relevant authorities.

Attachment and spare parts

Danger!
Danger to life if original attachment parts are **not** used!
If the crane is operated with attachment parts, which are **not** original, then the crane can fail and cause fatal accidents!
Crane components can be damaged!

! Operate the crane only with original attachment parts!
! Crane operation with attachment parts, which do **not** belong to the crane is prohibited!

Danger!
The crane permit and the manufacturer's warranty will become void!
If originally installed parts are modified, manipulated or replaced (e.g. removal of parts, installation of non-original parts), both the crane permit as well as the manufacturer's warranty will become void.

! Do not modify original parts.
! Do not remove original parts.
! Always use Liebherr original spare parts.

Definition of directional data

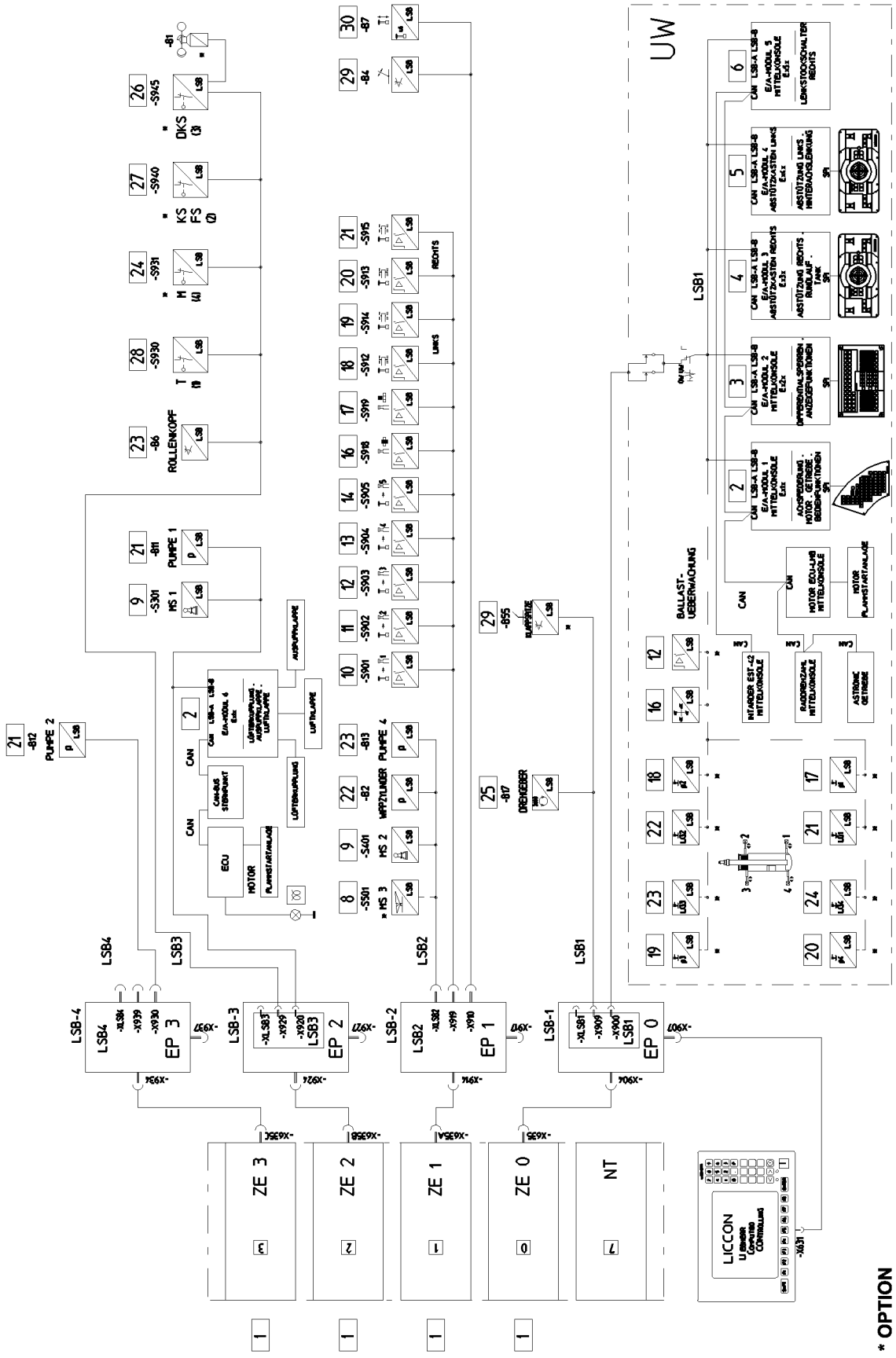
Forward driving means driving with the driver’s cab on the front.
Reverse driving means driving with the tail lights of the chassis on the front.
Front, **rear**, **right**, **left** on the **crane** refer to the condition, that the driver’s cab and the boom point in the same direction. Front is always in direction of the driver’s cab.
Front, **rear**, **right**, **left** in the **driver’s cab** refer to the crane chassis. The driver’s cab is always in the front.
Front, **rear**, **right**, **left** in the **crane operator’s cab** refer to the superstructure. Front is always in direction of the boom.

Customer request

Customer-specific equipment is marked with *.

Contents

20.00 Diagnostics


UW
LSB1
LSB4
LSB3
LSB2
LSB1
EP 3
EP 2
EP 1
EP 0
ZE 3
ZE 2
ZE 1
ZE 0
NT
LICCON
ECU
MOTOR
CAN
ROLLENKOPF
PUMPE 1
PUMPE 2
PUMPE 4
DREHGEBER
BALLAST-UEBERWACHUNG
* OPTION

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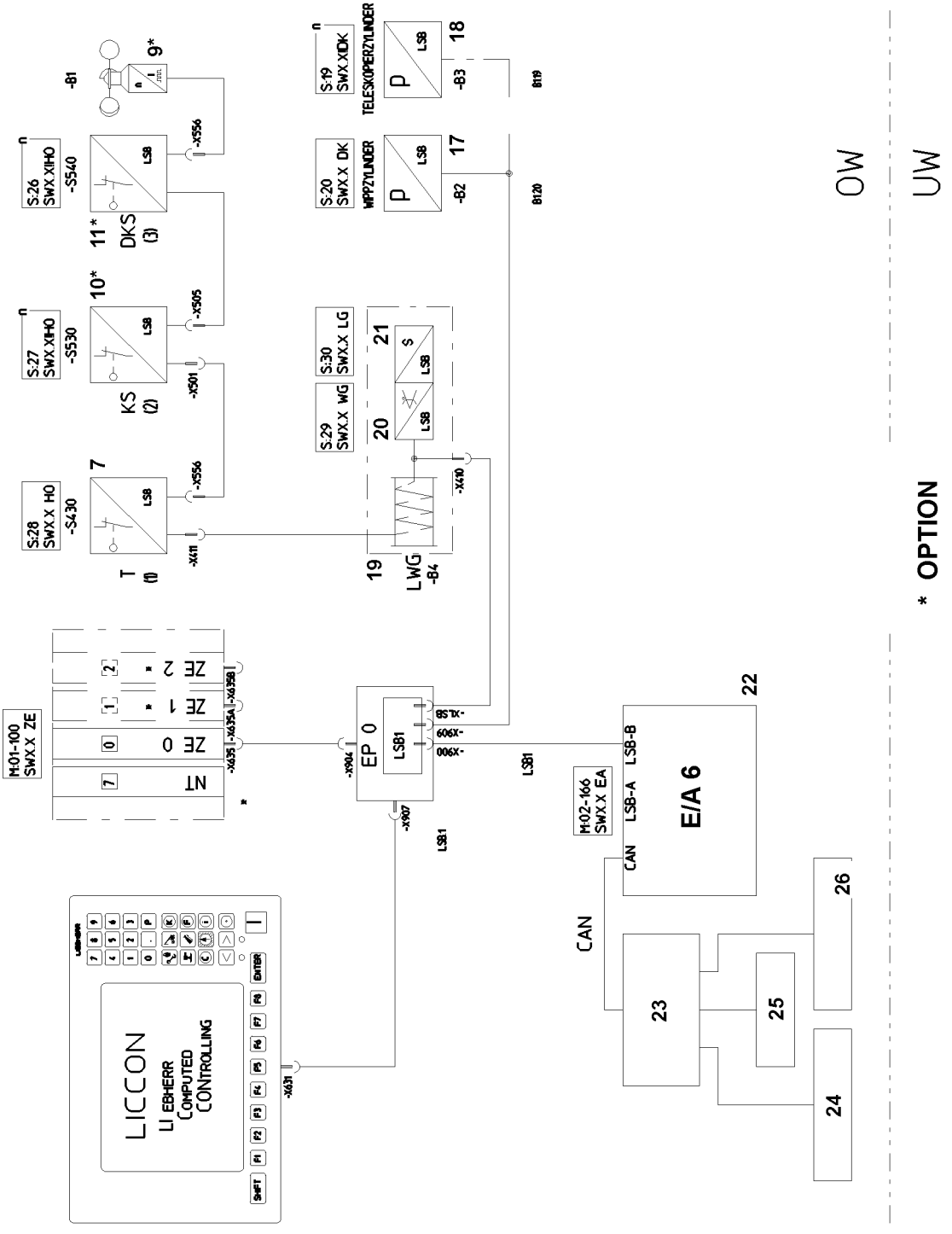
1 Bus system overview

Notice!
Note
! The complete overview of the bus system (see illustration on opposite page), should give you an overview about the configuration, the modules used (CPU's, EP's, …) and their assignment on the LIEBHERR system bus (LSB).
! The opposite illustration should only be viewed as an example!
! Depending on the size of the crane and the extent of the equipment, the LSB can be expanded "upward" by CPU's, EP's and various sensors.
! The detailed data for your crane is documented in the crane related LSB overviews in this chapter.

Explanation of terms:
CAN:
Controller-Area-Network (differential data transmission via conductors)
LSB:
LIEBHERR-System-Bus (LSB1, ... , LSBn).
Data transmission between the individual modules via three wire bus.
PU:
Power unit
CPU:
Central processing unit (CPU0, ... , CPUn)
IPCB:
Input printed circuit board (IPCB, ... , IPCBn)
Chassis:
Chassis
Superstructure:
Superstructure

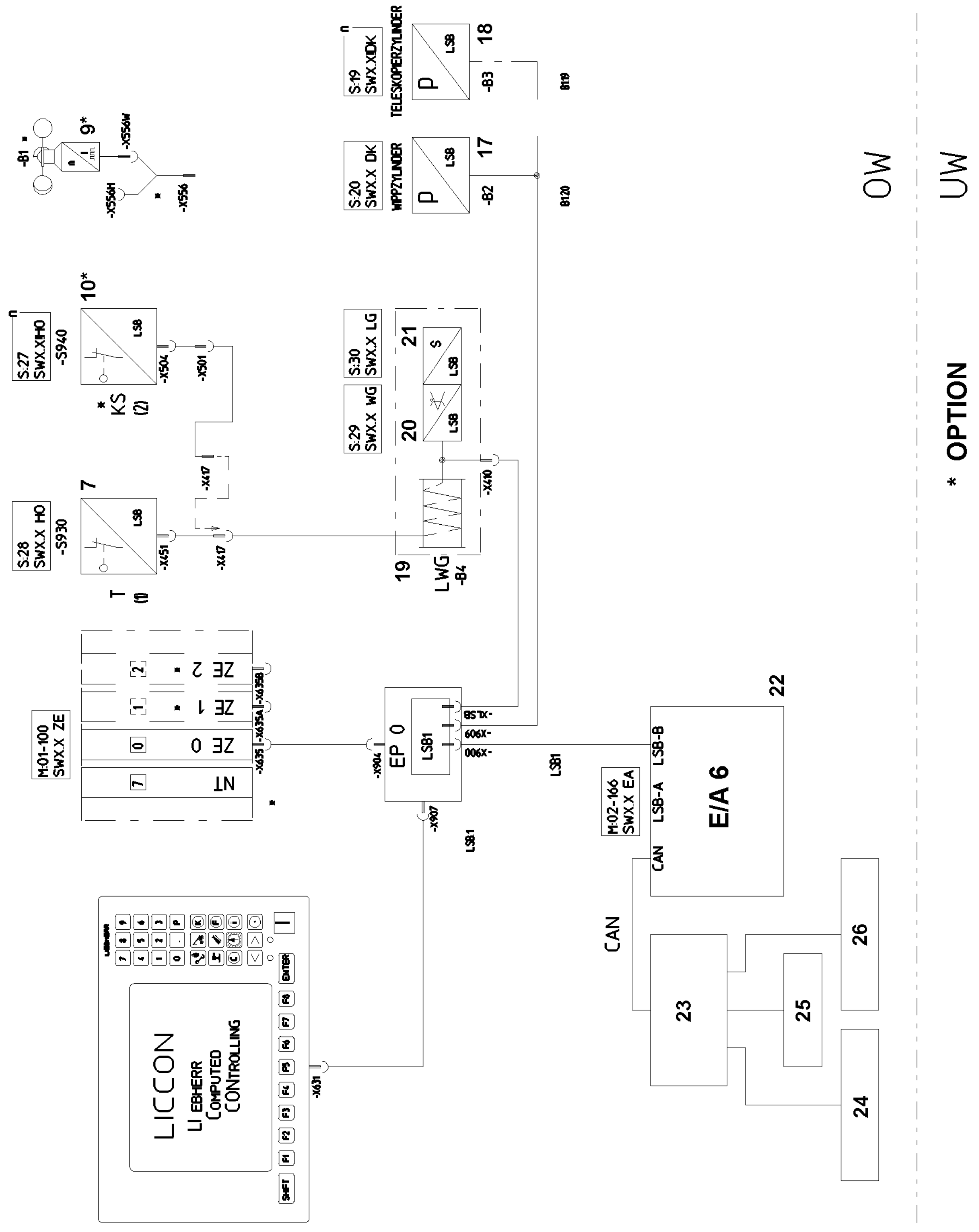

OW
UW
* OPTION
M:01-100 SWX.X ZE
NT
ZE 0
ZE 1 *
ZE 2 *
EP 0
LSB1
E/A 6
LSB-A LSB-B
CAN
M:02-166 SWX.X EA
LICCON
LI EBHERR
COMPUTED CONTROLLING
T (1)
KS (2)
DKS (3)
LWG -B4
S:28 SWX.X HO -S430
S:27 SWX.X HO -S530
S:26 SWX.X HO -S540
S:29 SWX.X WG
S:30 SWX.X LG
S:20 SWX.X DK
S:19 SWX.X DK
WIPPZYLINDER
TELESKOPERZYLINDER
LSB1
23
24
25
26

B102214

2 Bus system overview LTF1035-3.1

2.1 LSB1 overview

Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
—			
7	Hoist limit switch (HO) 1	Telescopic boom head, right	28
—			
9	Wind sensor		
10	Hoist limit switch (HO) 2	Single folding jib	27
11	Hoist limit switch (HO) 3	Dual folding jib	26
—			
17	Pressure sensor (DK)	Luffing cylinder, piston surface	20
18	Pressure sensor (DK)	Telescoping cylinder	19
19	Length angle sensor (LWG)	(see positions 20, 21)	
20	Angle sensor (WG)		29
21	Length sensor (LS)		30
22	Input/output module 6 (IO) (center console)	Check engine	2
23	Electrical control unit		
24	Cooling unit drive		
25	Heat flange		
26	Ventilation flap		

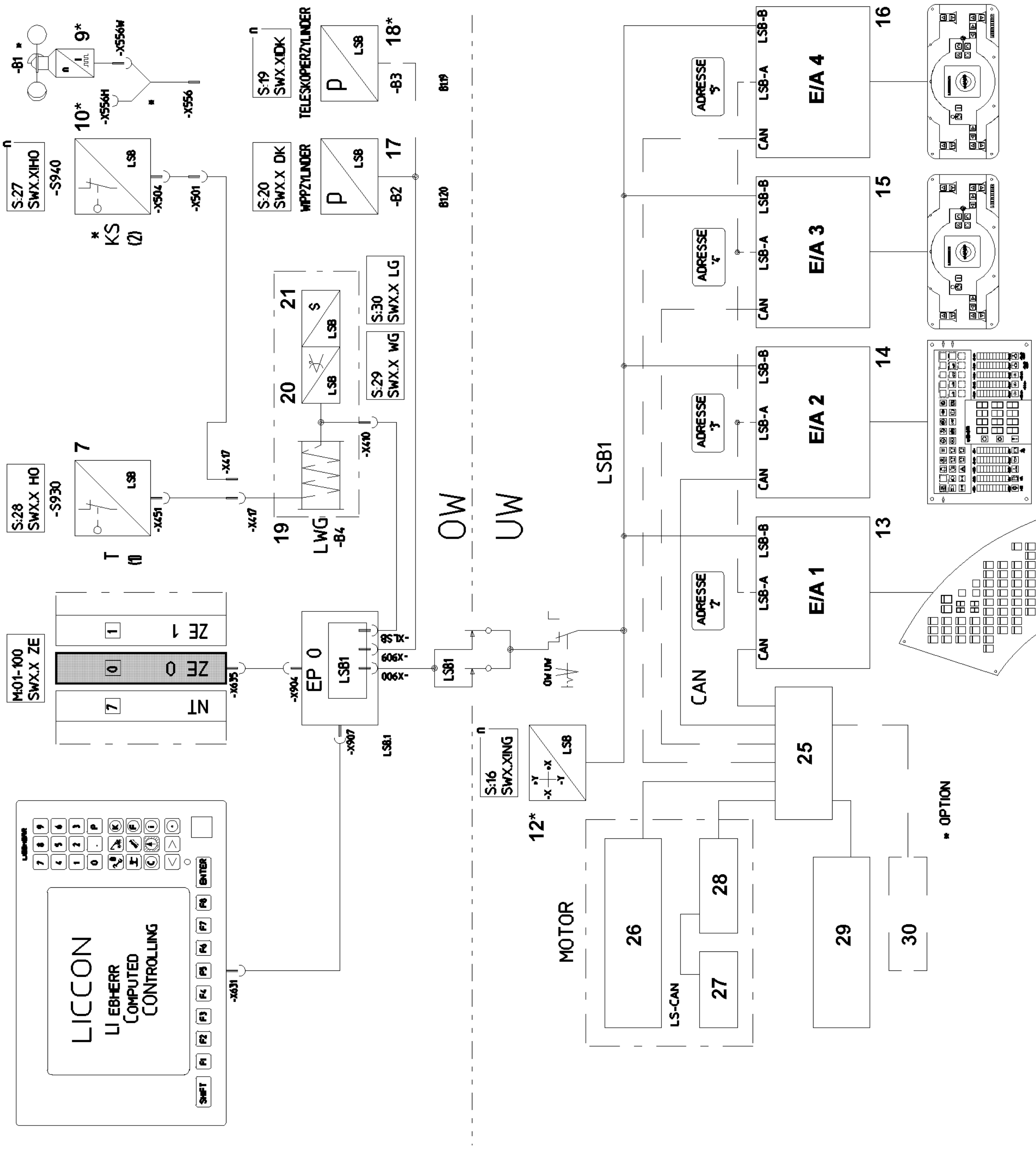

LICCON
LIEBHERR COMPUTED CONTROLLING
EP 0
LSB1
E/A 6
LSB-A
LSB-B
CAN
M-01-100 SWX.X ZE
M-02-166 SWX.X EA
ZE 0
ZE 1
ZE 2
NT
S:28 SWX.X HO
-S930
S:27 SWX.XIHO
-S940
KS
LWG
-B4
S:29 SWX.X WG
S:30 SWX.X LG
S:20 SWX.X DK
WIPPZYLINDER
S:19 SWX.XIDK
TELESKOPERZYLINDER
-B1
-B2
-B3
B119
B120
7
9*
10*
17
18
19
20
21
22
23
24
25
26
OW
UW
* OPTION

B102718

3 Bus system overview LTF1045-4.1

3.1 LSB1 overview

Pos.	Station		Bus address
ZE0	Central processing unit (ZE) 0 (control cabinet)		1
EP0	Input printed circuit board (EP) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	Not assigned		
2	Not assigned		
3	Not assigned		
4	Not assigned		
5	Not assigned		
6	Not assigned		
7	Hoist limit switch (HO) 1	Telescopic boom head, right	28
8	Not assigned		
9	Wind sensor		
10	Hoist limit switch (HO) 2	Single folding jib	27
...			
17	Pressure sensor (DK)	Luffing cylinder, piston surface	20
18	Pressure sensor (DK)	Telescoping cylinder	19
19	Length angle sensor (LWG)	(see positions 20, 21)	
20	Angle sensor (WG)		29
21	Length sensor (LG)		30
22	Input/output module 6 (EA) (center console)	Check engine	2
23	Electrical control unit		
24	Cooling unit drive		
25	Heat flange		
26	Ventilation flap		



* OPTION

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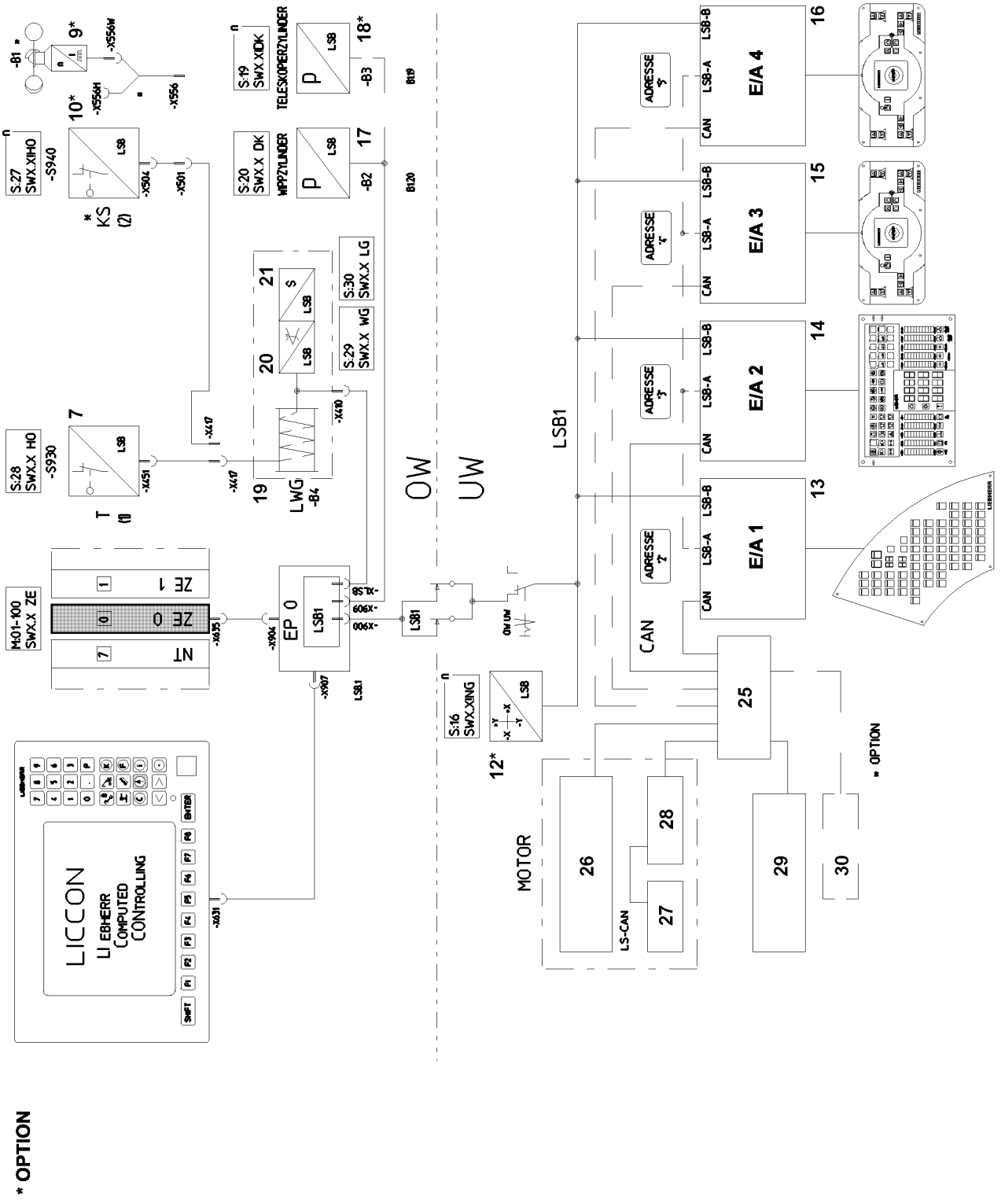
4 Bus system overview LTM1040-2.1

4.1 LSB1 overview

Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	not assigned		
2	not assigned		
3	not assigned		
4	not assigned		
5	not assigned		
6	not assigned		
7	Hoist limit switch (HO) 1	Telescopic boom head, right	
8	not assigned		
9	Wind sensor		
10	Hoist limit switch (HO) 2	Folding jib	
11	not assigned		
12	Inclination sensor (IS)		16
13	Input/output module 1 (IO) (center console)	Axle suspension, engine, transmission, control functions, keypad unit	2
14	Input/output module 2 (IO) (center console)	Differential locks, display functions, steering - superstructure, display unit	3
15	Input/output module 3 (IO) (right support box)	Right support, concentric running, right support control unit	4



*** OPTION**

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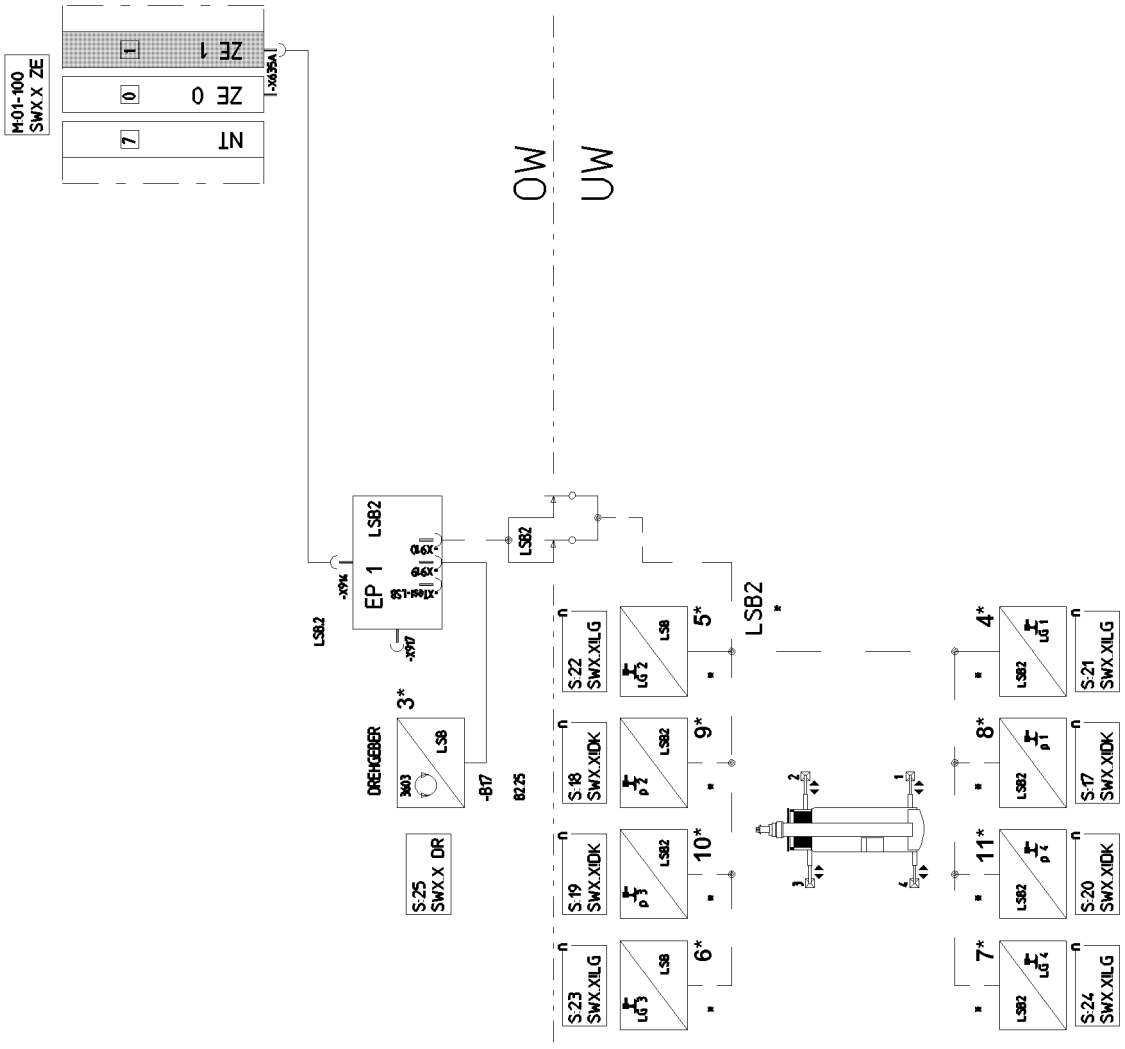
Pos.	Station		Bus address
16	Input/output module 4 (IO) (left support box)	Left support, rear axle steering, left support control unit	5
17	Pressure sensor (PS)	Luffing cylinder, piston surface	20
18	Pressure sensor (PS)	Telescoping cylinder (pressure compensation)	19
19	Length angle sensor (LAS)	(see positions 20, 21)	
20	Angle sensor (WG)		29
21	Length sensor (LS)		30
22	not assigned		
23	not assigned		
24	not assigned		
25	CAN bus neutral point, (center console)		
26	Adaption module (center console)		
27	PLD (engine)		
28	FMR (center console)		
29	Transmission EST-37 (center console)		
30	ABS (center console)		



*** OPTION**

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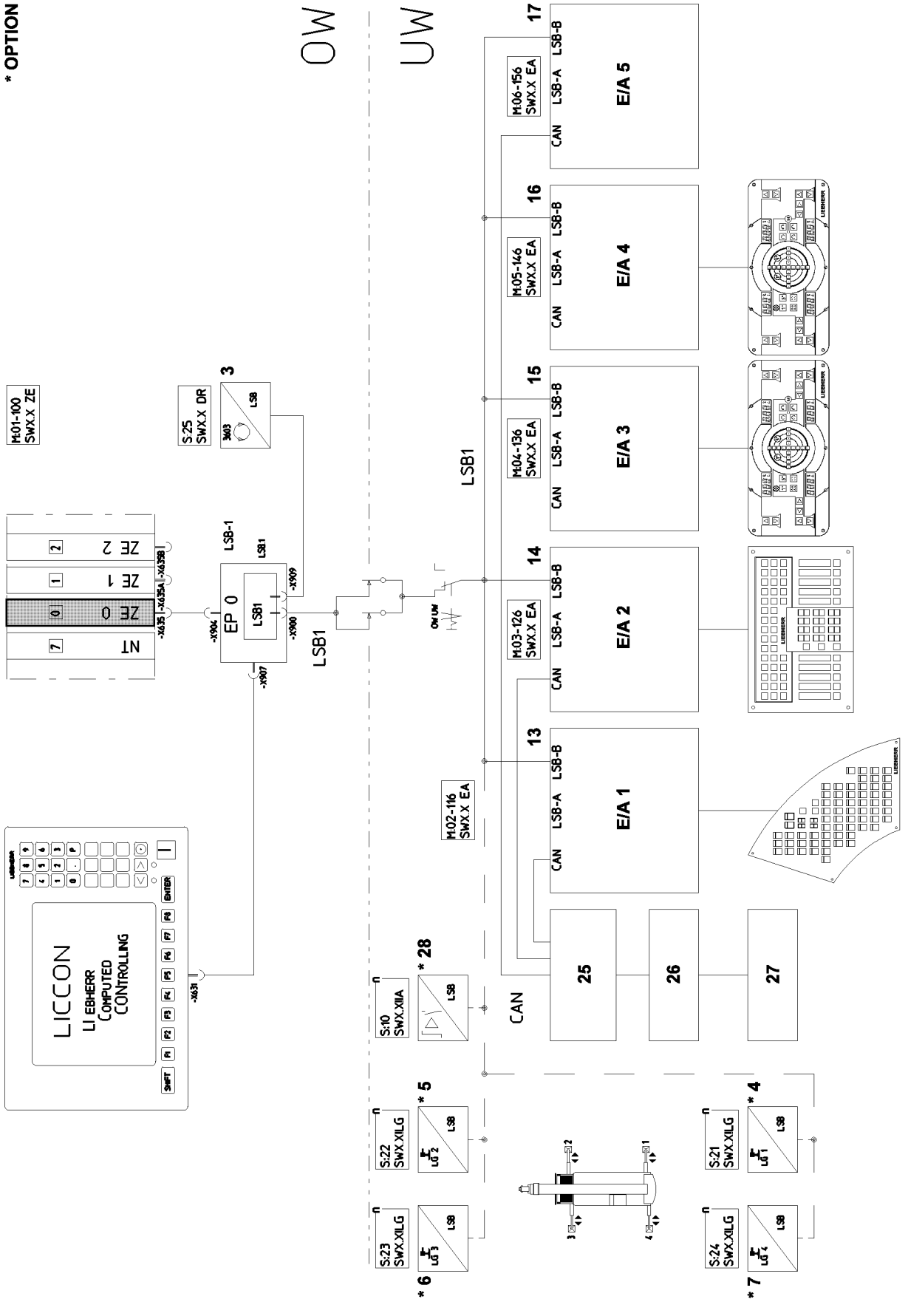
4.2 LSB2 overview*

Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 1 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 1 (control cabinet)		
LSB1	LIEBHERR-System-Bus 2		
1	not assigned		
2	not assigned		
3	Shaft encoder (SE)	Boom direction	25
4	Length sensor (LS)	Sliding beam 1, right rear	21
5	Length sensor (LS)	Sliding beam 2, front right	22
6	Length sensor (LS)	Sliding beam 3, front left	23
7	Length sensor (LS)	Sliding beam 4, left rear	24
8	Pressure sensor (PS)	Support cylinder, right rear	17
9	Pressure sensor (PS)	Support cylinder, right front	18
10	Pressure sensor (PS)	Support cylinder, left front	19
11	Pressure sensor (PS)	Support cylinder, left rear	20
12	not assigned		
13	not assigned		
14	not assigned		
15	not assigned		

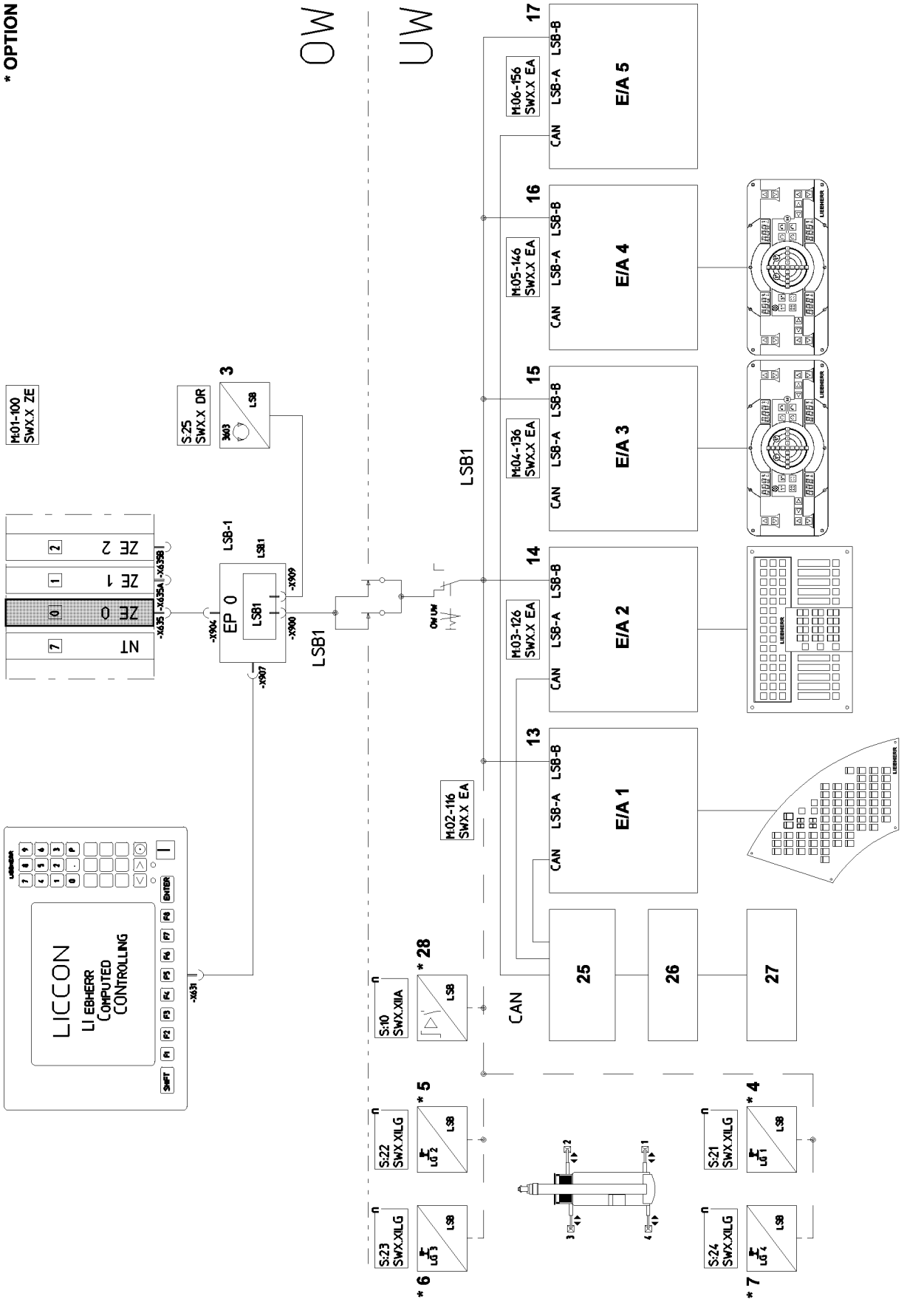

* OPTION
OW
UW
M:01-100 SWX.X ZE
S:25 SWX.X DR
3
LSB
LSB-1
LSB1
EP 0
-X904
-X909
-X900
-X907
-X635
-X635A
-X639B
ZE 2
ZE 1
ZE 0
NT
LSB1
OW UW
LSB1
CAN
M:06-156 SWX.X EA
17
E/A 5
M:05-146 SWX.X EA
16
E/A 4
M:04-136 SWX.X EA
15
E/A 3
M:03-126 SWX.X EA
14
E/A 2
M:02-116 SWX.X EA
13
E/A 1
CAN LSB-A LSB-B
25
26
27
* 28
S:10 SWX.XIIA
* 5
S:22 SWX.XILG
* 6
S:23 SWX.XILG
* 4
S:21 SWX.XILG
* 7
S:24 SWX.XILG
LICCON
LIEBHERR COMPUTED CONTROLLING
-X631
SHIFT
ENTER

B197951

5 Bus system overview LTM1070-4.1

5.1 LSB1 overview

Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	not assigned		
2	not assigned		
3	Shaft encoder (SE)	Direction of boom	25
4	Length sensor (LS)	Sliding beam 1, rear right	21
5	Length sensor (LS)	Sliding beam 2, front right	22
6	Length sensor (LS)	Sliding beam 3, front left	23
7	Length sensor (LS)	Sliding beam 4, rear left	24
8	not assigned		
9	not assigned		
10	not assigned		
11	not assigned		
12	not assigned		
13	Input/output module 1 (IO) (center console)	Axle suspension, engine, transmission, control functions, keypad unit	2
14	Input/output module 2 (IO) (center console)	Differential locks, display functions, steering - superstructure, display unit	3
15	Input/output module 3 (IO) (right support box)	Right support, concentric running, tank, right support control unit	4


* OPTION
OW
UW
LSB1
CAN
M:01-100 SWX.X ZE
S:25 SWX.X DR
3
LSB
LSB-1
EP 0
-X904
-X909
-X900
-X907
-X635
-X635A
-X639B
ZE 2
ZE 1
ZE 0
NT
OW UW
M:02-116 SWX.X EA
M:03-126 SWX.X EA
M:04-136 SWX.X EA
M:05-146 SWX.X EA
M:06-156 SWX.X EA
CAN LSB-A LSB-B
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
13
14
15
16
17
25
26
27
LICCON
LIEBHERR COMPUTED CONTROLLING
-X631
S:10 SWX.XIIA
* 28
S:22 SWX.XILG
* 5
S:23 SWX.XILG
* 6
S:21 SWX.XILG
* 4
S:24 SWX.XILG
* 7

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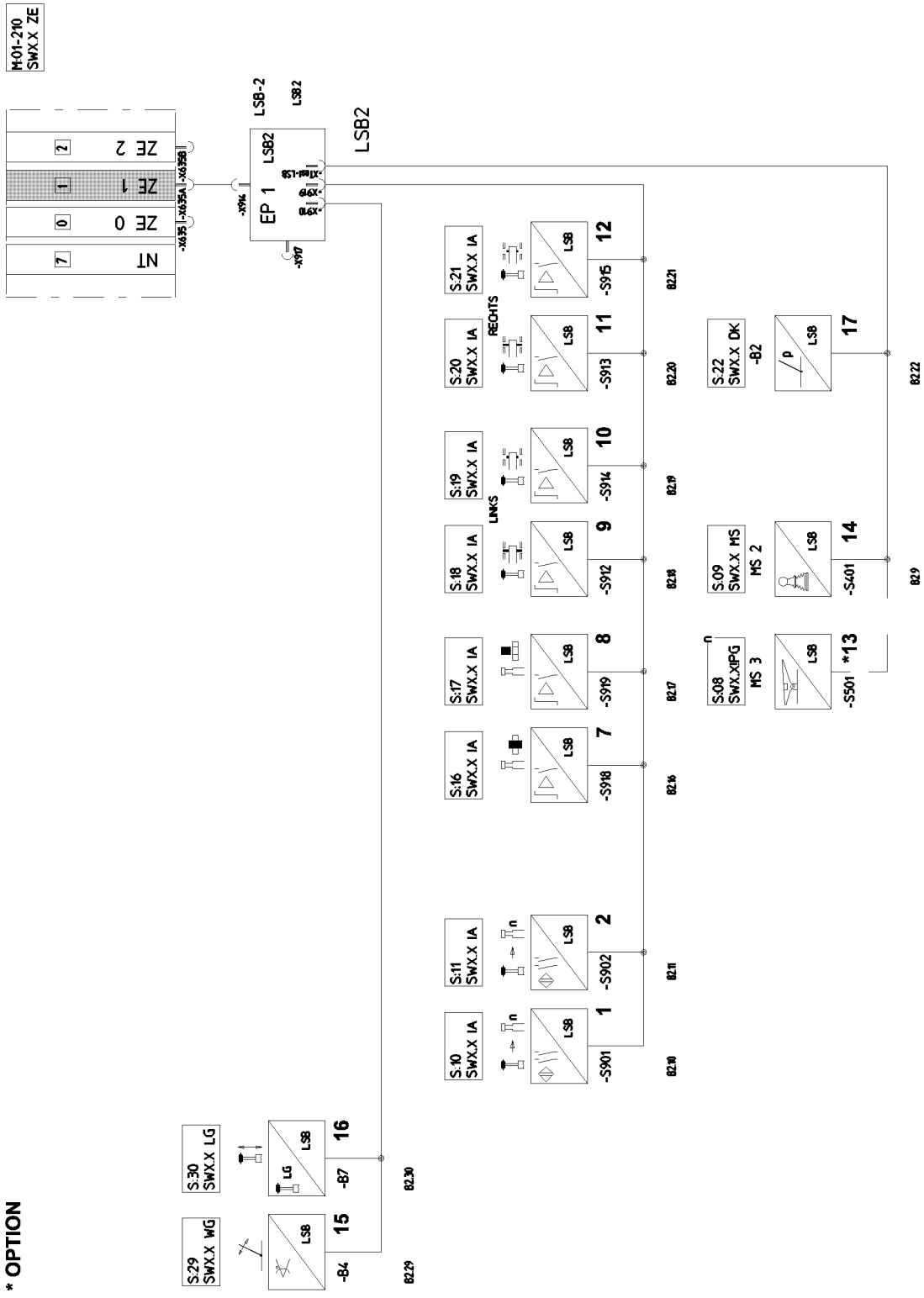
Pos.	Station		Bus address
16	Input/output module 4 (IO) (left support box)	Left support, rear axle steering, left support control unit	5
17	Input/output module 5 (IO) (center console)	Right-hand steering column switch	6
18	not assigned		
19	not assigned		
20	not assigned		
21	not assigned		
22	not assigned		
23	not assigned		
24	not assigned		
25	CAN bus neutral point, (center console)		
26	Electrical control unit-LMB engine (center console)		
27	Engine flame starting device		
28	Inductive sensor (IS)	Telescopic boom in the deposit frame	10


M:01-210
SWX.X ZE
ZE 2
ZE 1
ZE 0
NT
LSB-2
LSB2
EP 1
LSB2
S:10
SWX.X IA
S:11
SWX.X IA
S:16
SWX.X IA
S:17
SWX.X IA
S:18
SWX.X IA
S:19
SWX.X IA
S:20
SWX.X IA
S:21
SWX.X IA
LINKS
RECHTS
S:08
SWX.X MS
MS 3
S:09
SWX.X MS
MS 2
S:22
SWX.X DK
-B2
S:29
SWX.X WG
S:30
SWX.X LG
LSB
* OPTION

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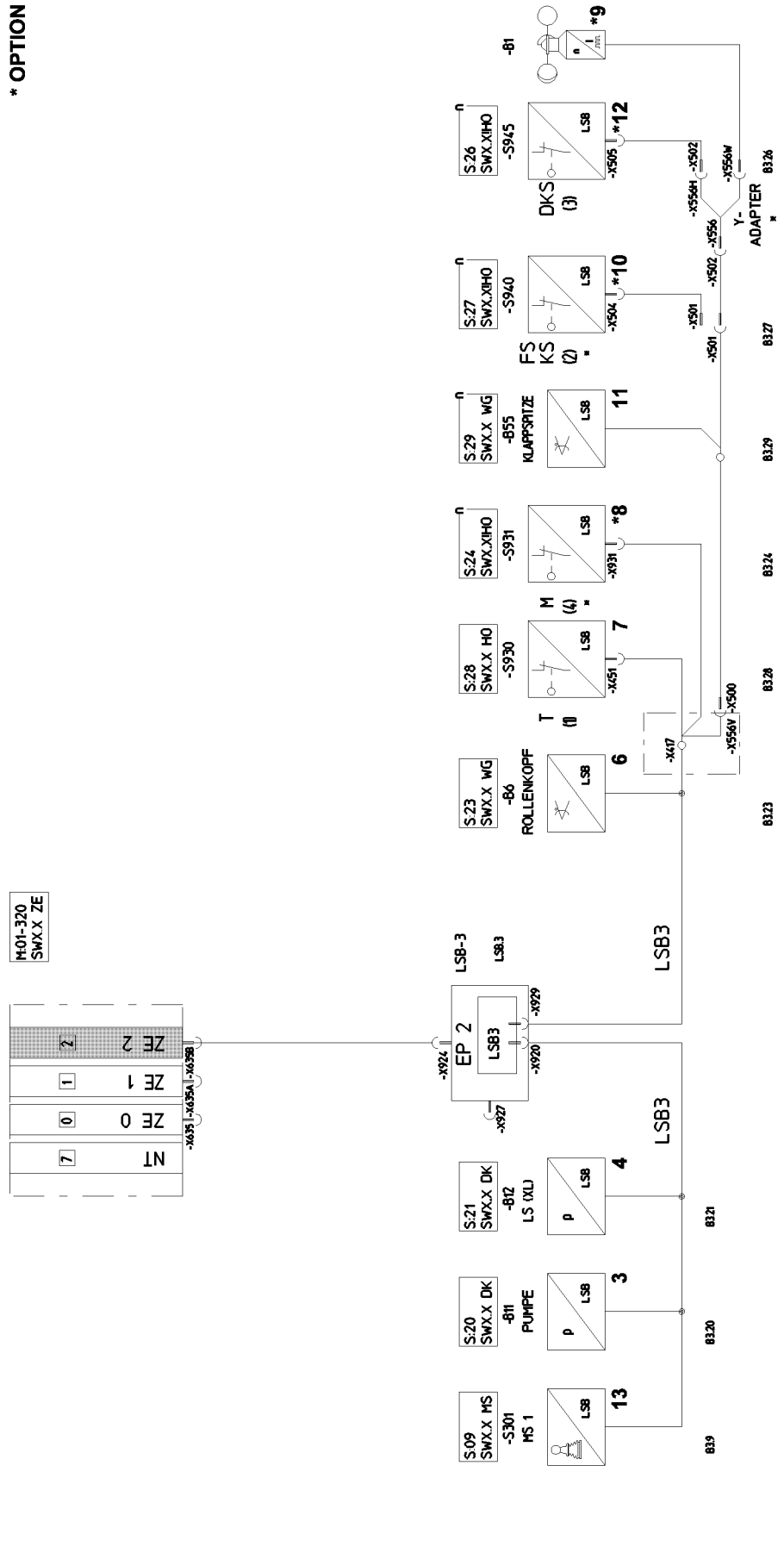
5.2 LSB2 overview

Pos.	Station		Bus address
CPU-1	Central processing unit (CPU) 1 (control cabinet)		1
IPC-B1	Input printed circuit board (IPCB) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
1	Inductive sensor (IS)	Tracking sensor, right	10
2	Inductive sensor (IS)	Tracking sensor, left	11
3	not assigned		
4	not assigned		
5	not assigned		
6	not assigned		
7	Inductive sensor (IS)	Telescopic boom, pinned	16
8	Inductive sensor (IS)	Telescopic boom, unpinned	17
9	Inductive sensor (IS)	Cylinder pinned, left	18
10	Inductive sensor (IS)	Cylinder unpinned, left	19
11	Inductive sensor (IS)	Cylinder pinned, right	20
12	Inductive sensor (IS)	Cylinder unpinned, right	21
13	Pedal sensor (PS) (MS3)		8
14	Master switch 2 (MS2)		9
15	Angle sensor (AS)	Tele pivot section	29
16	Length sensor (LS)	Telescoping cylinder	30
17	Pressure sensor (PS)	Luffing cylinder, piston surface	22
18	not assigned		
19	not assigned		
20	not assigned		


* OPTION
M:01-320
SWX.X ZE
ZE 2
ZE 1
ZE 0
NT
-X635
-X635A
-X635B
LSB-3
LSB3
EP 2
-X924
-X927
-X929
-X920
LSB3
LSB3
LSB3
S:09
SWX.X MS
-S301
MS 1
13
839
S:20
SWX.X DK
-811
PUMPE
3
8320
S:21
SWX.X DK
-812
LS (XL)
4
8321
S:23
SWX.X WG
-B6
ROLLENKOPF
6
8323
T
(1)
S:28
SWX.X HO
-S930
-X451
7
8328
-X417
-X500
-X556V
M
(4)
*
S:24
SWX.XHHO
-S931
-X931
*8
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SWX.X WG
-B55
KLAPPSPITZE
11
8329
FS
KS
(2)
*
S:27
SWX.XHHO
-S940
-X504
*10
8327
-X501
-X502
-X501
-X556
-X556W
Y-
ADAPTER
*
8326
DKS
(3)
S:26
SWX.XHHO
-S945
-X505
*12
-X5502
-X5504
-81
*9

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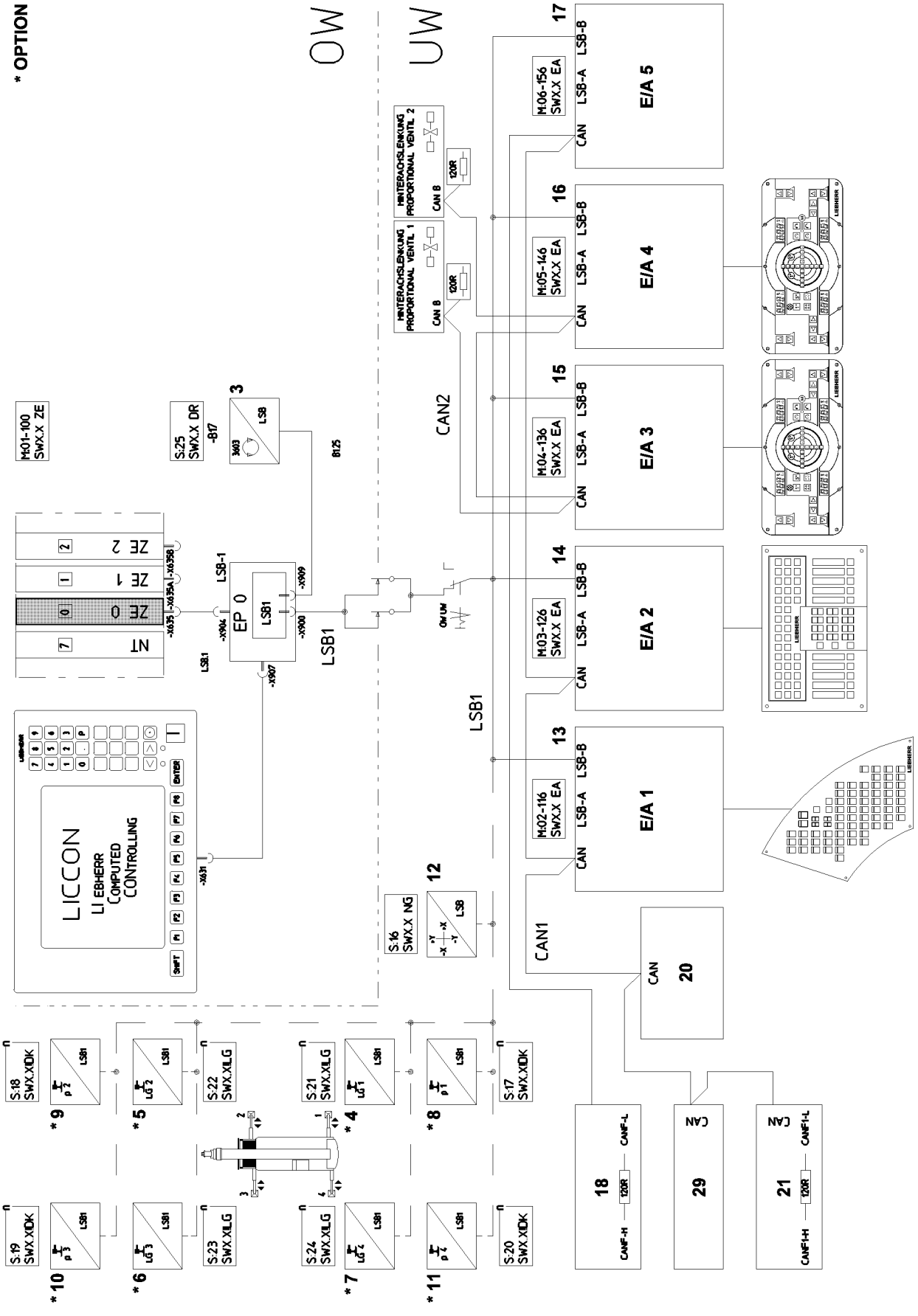
5.3 LSB3 overview

Pos.	Station		Bus address
CPU-2	Central processing unit (CPU) 2 (control cabinet)		1
IPC-B2	Input printed circuit board (IPCB) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
1	not assigned		
2	not assigned		
3	Pressure sensor (PS)	Pump	20
4	Pressure sensor (PS)	Load signal	21
5	not assigned		
6	Angle sensor (AS)	Pulley head	23
7	Hoist limit switch (HO) 1	Telescopic boom head, right	28
8	Hoist limit switch (HO) 4	Boom nose (2nd HO Tele left)	24
9	Wind sensor		
10	Hoist limit switch (HO) 2	Single folding jib/roller set	27
11	Angle sensor (AS)	Folding jib	29
12	Hoist limit switch (HO) 3	Dual folding jib	26
13	not assigned		
14	not assigned		
15	not assigned		
16	not assigned		
17	not assigned		
18	not assigned		
19	not assigned		
20	not assigned		

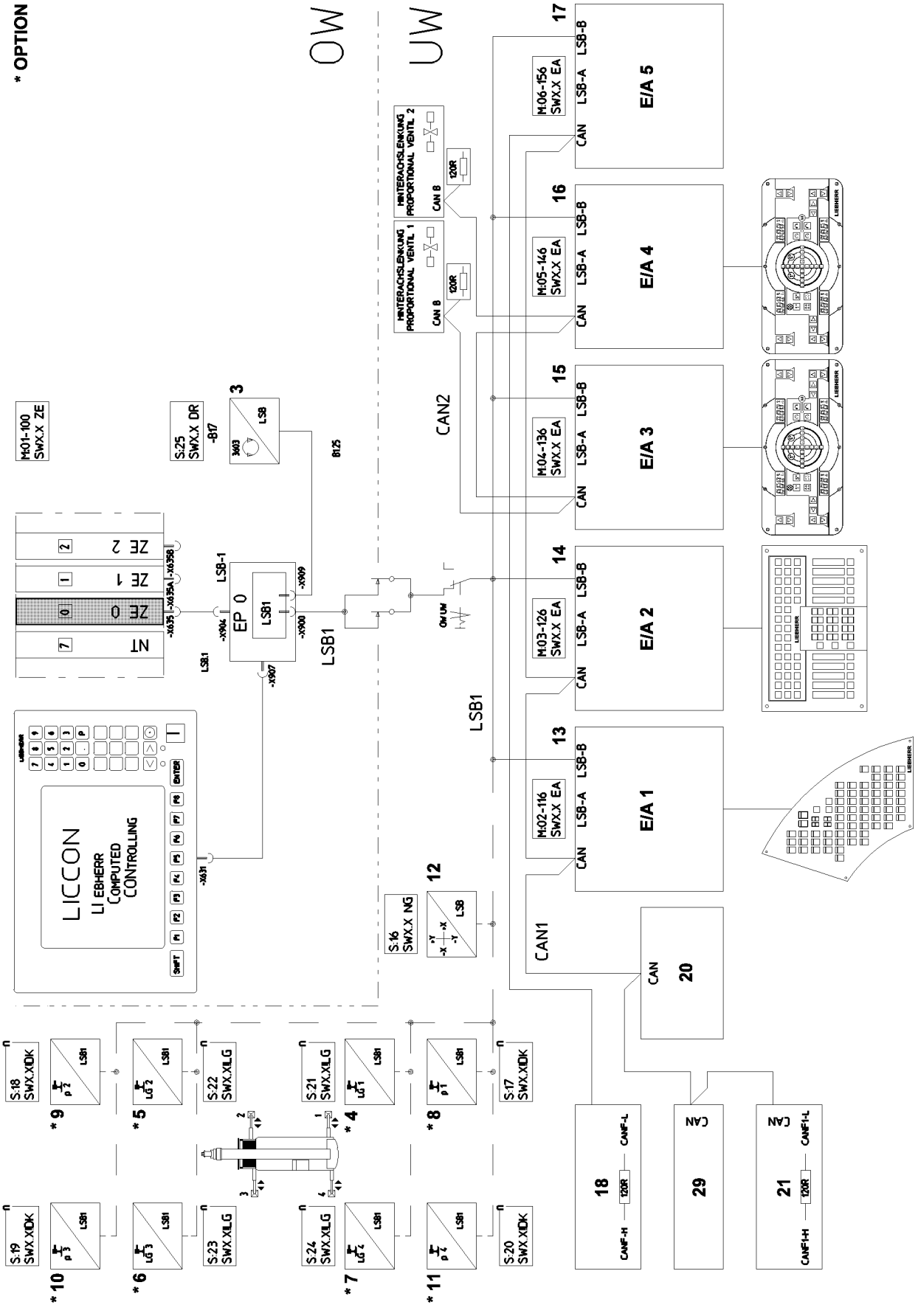

* OPTION
OW
UW
M:01-100
SWX.X ZE
S:25
SWX.X DR
-B17
3
3603
LSB
B125
CAN2
HINTERACHSLENKUNG
PROPORTIONAL VENTIL 1
HINTERACHSLENKUNG
PROPORTIONAL VENTIL 2
CAN B
120R
M:06-156
SWX.X EA
M:05-146
SWX.X EA
M:04-136
SWX.X EA
M:03-126
SWX.X EA
M:02-116
SWX.X EA
CAN LSB-A LSB-B
E/A 5
E/A 4
E/A 3
E/A 2
E/A 1
17
16
15
14
13
ZE 2
ZE 1
ZE 0
NT
-X635B
-X635A
-X635
LSB-1
EP 0
LSB1
-X904
-X909
-X900
-X907
LSB:1
-X631
LICCON
LI EBHERR
COMPUTED
CONTROLLING
ENTER
SHIFT
S:16
SWX.X NG
12
LSB
CAN1
CAN
20
18
CANF-H
CANF-L
120R
29
21
S:18
SWX.XIOK
S:19
SWX.XIOK
S:22
SWX.XLG
S:23
SWX.XLG
S:21
SWX.XLG
S:24
SWX.XLG
S:17
SWX.XIOK
S:20
SWX.XIOK
* 9
* 10
* 5
* 6
* 4
* 7
* 8
* 11
LSB1

B198058

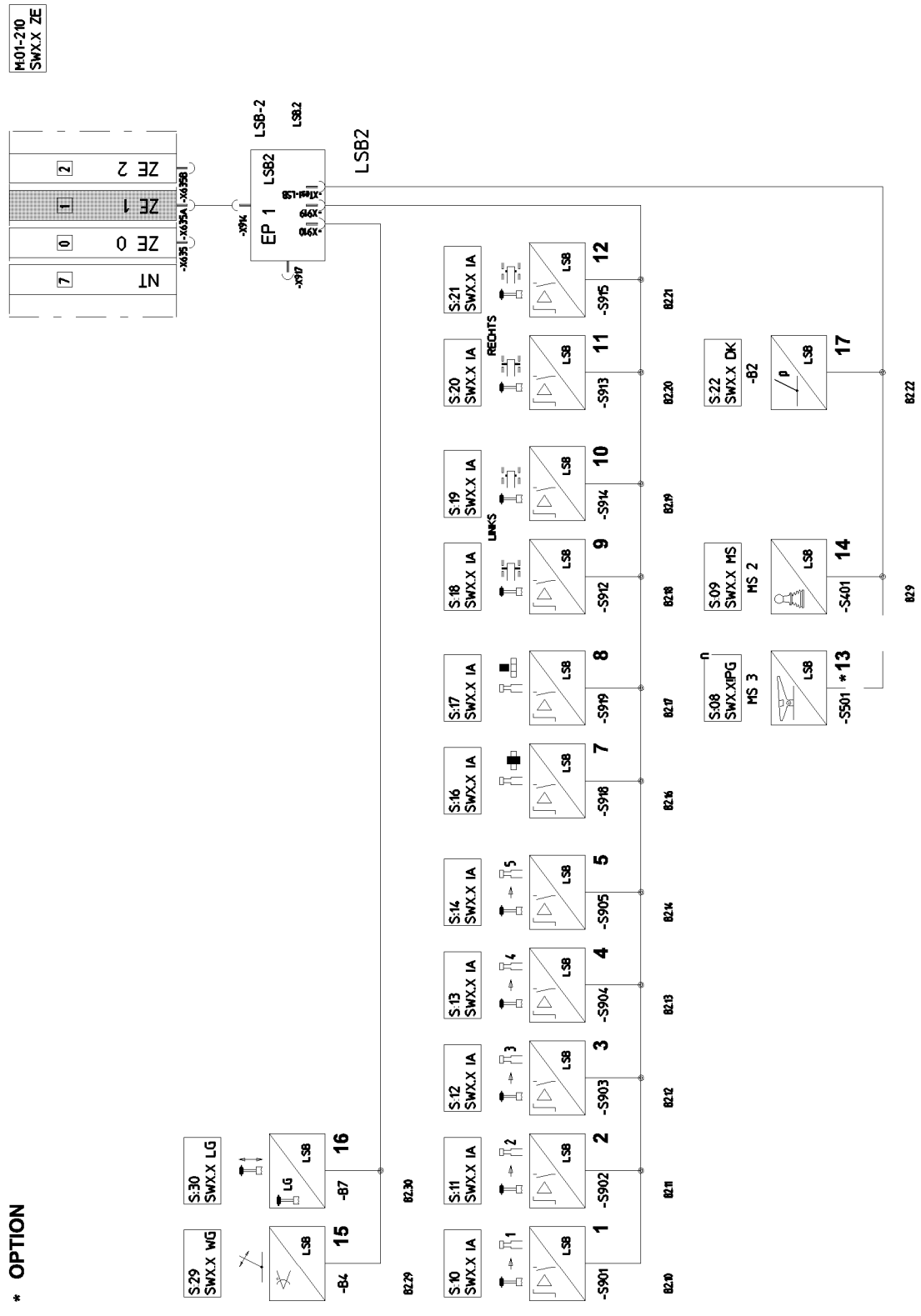
6 Bus system overview LTM1090-4.1

6.1 LSB1 overview

Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	not assigned		
2	not assigned		
3	Shaft encoder (SE)	Direction of boom	25
4	Length sensor (LS)	Sliding beam 1, rear right	21
5	Length sensor (LS)	Sliding beam 2, front right	22
6	Length sensor (LS)	Sliding beam 3, front left	23
7	Length sensor (LS)	Sliding beam 4, rear left	24
8	Pressure sensor (PS)	Support cylinder, rear right	17
9	Pressure sensor (PS)	Support cylinder, front right	18
10	Pressure sensor (PS)	Support cylinder, front left	19
11	Pressure sensor (PS)	Support cylinder, rear left	20
12	Inclination sensor (IS)		16
13	Input/output module 1 (IO) (center console)	Axle suspension, engine, transmission, control functions, keypad unit	2
14	Input/output module 2 (IO) (center console)	Differential locks, display functions, steering - superstructure, display unit	3
15	Input/output module 3 (IO) (right support box)	Right support, concentric running, tank, right support control unit	4


* OPTION
OW
UW
LICCON
LIEBHERR COMPUTED CONTROLLING
EP 0
LSB1
CAN1
CAN2
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
M:01-100 SWX.X ZE
S:25 SWX.X DR -B17
M:02-116 SWX.X EA
M:03-126 SWX.X EA
M:04-136 SWX.X EA
M:05-146 SWX.X EA
M:06-156 SWX.X EA
S:16 SWX.X NG
HINTERACHSLENKUNG PROPORTIONAL VENTIL 1
HINTERACHSLENKUNG PROPORTIONAL VENTIL 2
ZE 0
ZE 1
ZE 2
NT
B125
B198058

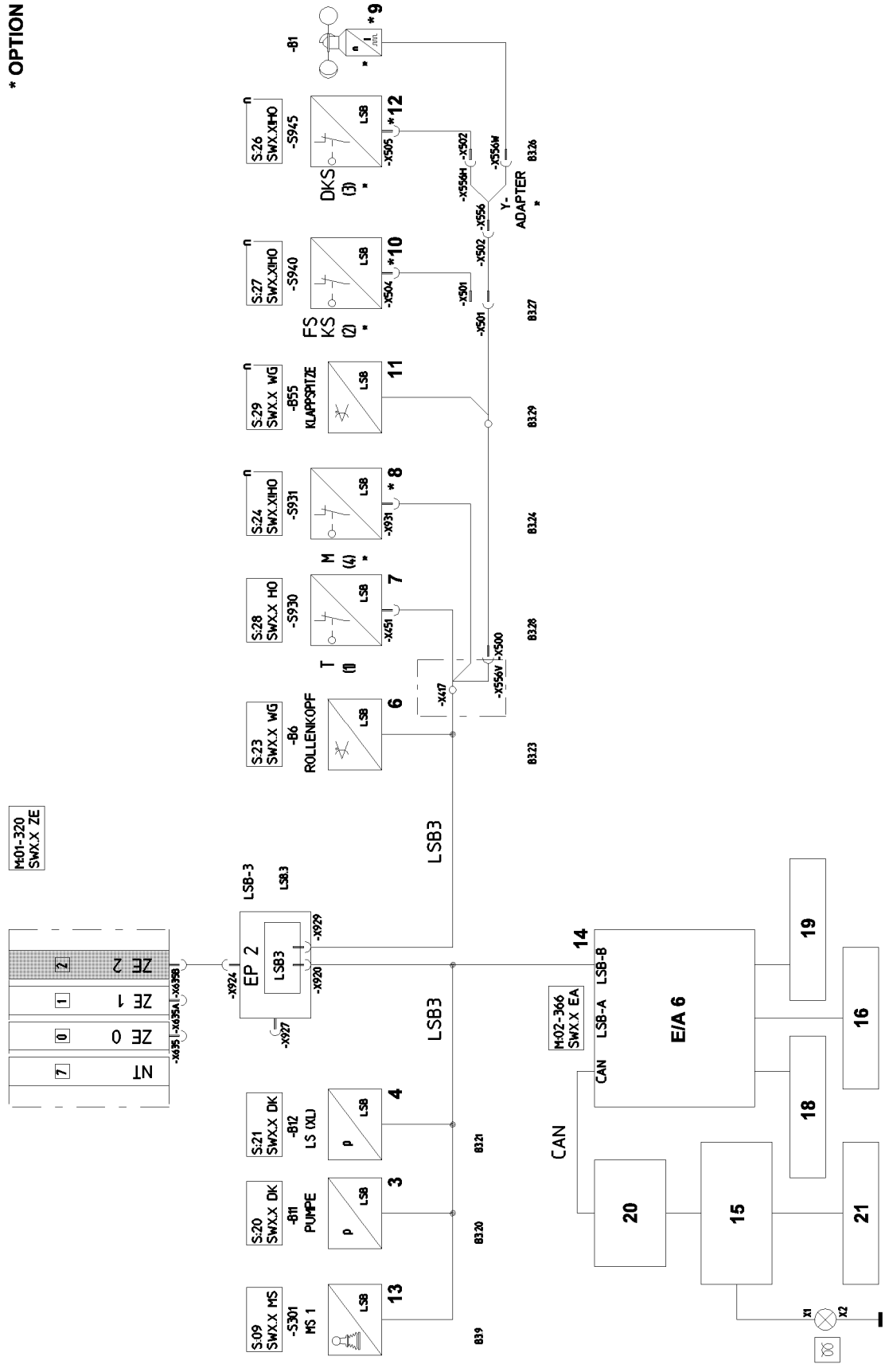
Pos.	Station		Bus address
16	Input/output module 4 (IO) (left support box)	Left support, rear axle steering, left support control unit	5
17	Input/output module 5 (IO) (center console)	Right-hand steering column switch	6
18	Intarder EST-42 (center console)		
19	not assigned		
20	Motor electrical control unit		
21	AS-Tronic transmission		
22	not assigned		
23	not assigned		
24	not assigned		
25	not assigned		
26	not assigned		
27	not assigned		
28	not assigned		
29	Wheel speed (center console)		


M:01-210
SWX.X ZE
NT
ZE 0
ZE 1
ZE 2
LSB-2
LSB2
EP 1
LSB2
S:29 SWX.X WG
S:30 SWX.X LG
S:10 SWX.X IA
S:11 SWX.X IA
S:12 SWX.X IA
S:13 SWX.X IA
S:14 SWX.X IA
S:16 SWX.X IA
S:17 SWX.X IA
S:18 SWX.X IA
S:19 SWX.X IA
S:20 SWX.X IA
S:21 SWX.X IA
S:22 SWX.X DK
-B2
S:09 SWX.X MS
MS 2
S:08 SWX.XPG
MS 3
LINKS
RECHTS
LSB
LG
-B4
-B7
-S901
-S902
-S903
-S904
-S905
-S906
-S907
-S908
-S909
-S910
-S911
-S912
-S913
-S914
-S915
-S401
-S501
* OPTION

B198059

6.2 LSB2 overview

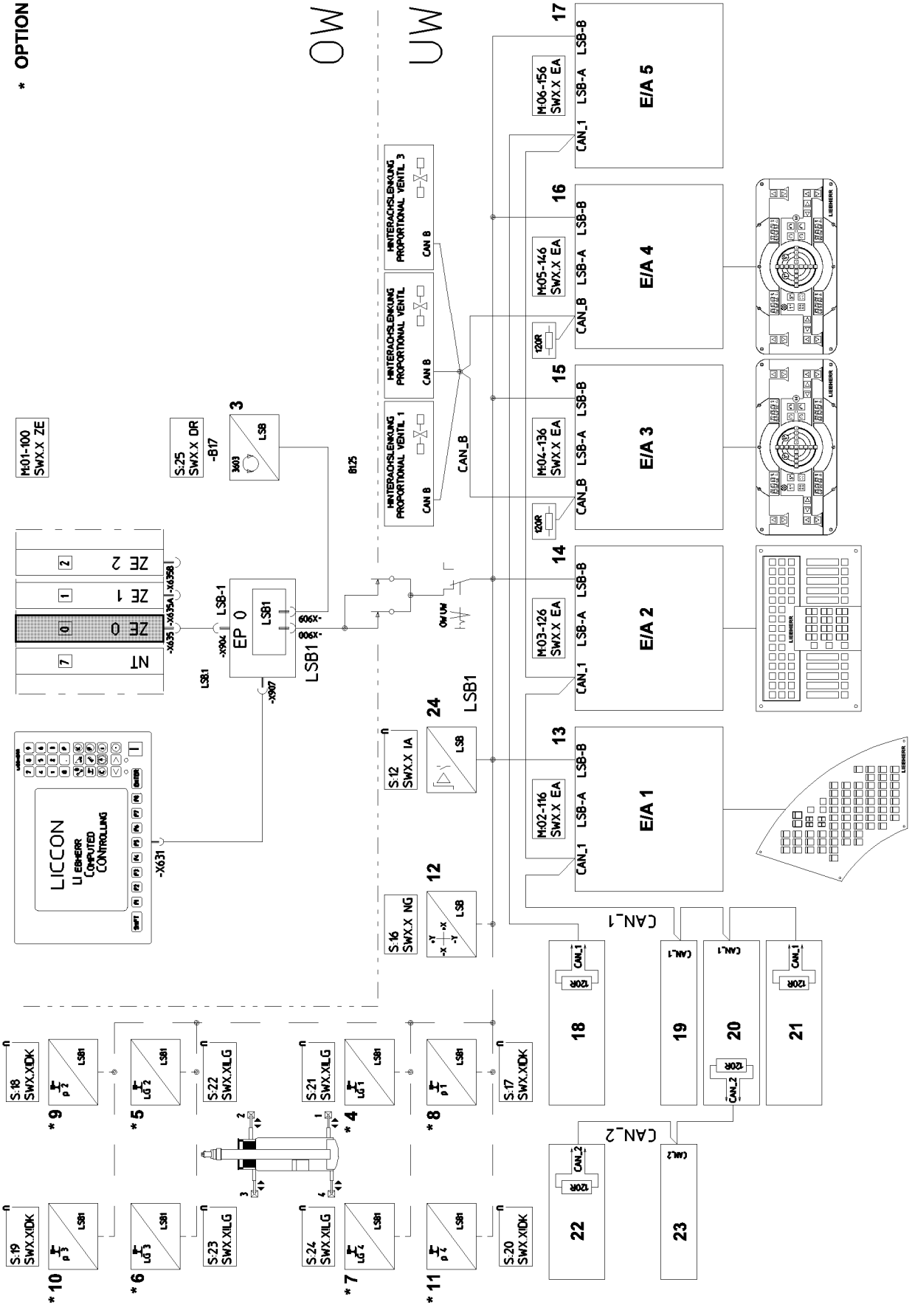
Pos.	Station		Bus address
CPU-1	Central processing unit (CPU) 1 (control cabinet)		1
IPC-B1	Input printed circuit board (IPCB) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
1	Inductive sensor (IS)	Tele pinning 1	10
2	Inductive sensor (IS)	Tele pinning 2	11
3	Inductive sensor (IS)	Tele pinning 3	12
4	Inductive sensor (IS)	Tele pinning 4	13
5	Inductive sensor (IS)	Tele pinning 5	14
6	not assigned		
7	Inductive sensor (IS)	Telescopic boom, pinned	16
8	Inductive sensor (IS)	Telescopic boom, unpinned	17
9	Inductive sensor (IS)	Cylinder pinned, left	18
10	Inductive sensor (IS)	Cylinder unpinned, left	19
11	Inductive sensor (IS)	Cylinder pinned, right	20
12	Inductive sensor (IS)	Cylinder unpinned, right	21
13	Pedal sensor (PS) (MS3)		8
14	Master switch 2 (MS2)		9
15	Angle sensor (AS)	Tele pivot section	29
16	Length sensor (LS)	Telescoping cylinder	30
17	Pressure sensor (PS)	Luffing cylinder, piston surface	22
18	not assigned		
19	not assigned		
20	not assigned		


* OPTION
M:01-320
SWX.X ZE
ZE 2
ZE 1
ZE 0
NT
-X924
-X927
-X929
-X920
EP 2
LSB3
LSB-3
LSB.3
LSB3
LSB3
-X417
-X500
-X556V
S:23
SWX.X WG
-B6
ROLLENKOPF
6
S:28
SWX.X HO
-S930
T
(1)
7
-X451
S:24
SWX.XHHO
-S931
M
(4)
* 8
-X931
S:29
SWX.X WG
-B55
KLAPPSPITZE
11
S:27
SWX.XHHO
-S940
FS
KS
(2)
*10
-X504
S:26
SWX.XHHO
-S945
DKS
(3)
*12
-X505
-B1
* 9
-X502
-X556H
-X556
-X556W
Y-
ADAPTER
-X501
-X501
8326
8327
8329
8324
8328
8323
S:09
SWX.X MS
-S301
MS 1
13
S:20
SWX.X DK
-B11
PUMPE
3
S:21
SWX.X DK
-B12
LS (XL)
4
8320
8321
839
M:02-366
SWX.X EA
14
CAN
LSB-A
LSB-B
E/A 6
CAN
19
16
18
20
15
21
X1
X2

B198060

6.3 LSB3 overview

Pos.	Station		Bus address
CPU-2	Central processing unit (CPU) 2 (control cabinet)		1
IPC-B2	Input printed circuit board (IPCB) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
1	not assigned		
2	not assigned		
3	Pressure sensor (PS)	Pump	20
4	Pressure sensor (PS)	Load signal	21
5	not assigned		
6	Angle sensor (AS)	Pulley head	23
7	Hoist limit switch (HO) 1	Telescopic boom head, right	28
8	Hoist limit switch (HO) 4	Boom nose (2nd HO Tele left)	24
9	Wind sensor		
10	Hoist limit switch (HO) 2	Single folding jib/roller set	27
11	Angle sensor (AS)	Folding jib	29
12	Hoist limit switch (HO) 3	Dual folding jib	26
13	Master switch 1 (MS1)		9
14	Input/output module 6 (IO)	Cooler drive, exhaust flap retention strap, ventilation flap	2
15	Motor electrical control unit		
16	Ventilation flap		
17	not assigned		
18	Cooler drive		
19	Exhaust flap retention strap		
20	CAN bus neutral point		
21	Flame starting device		

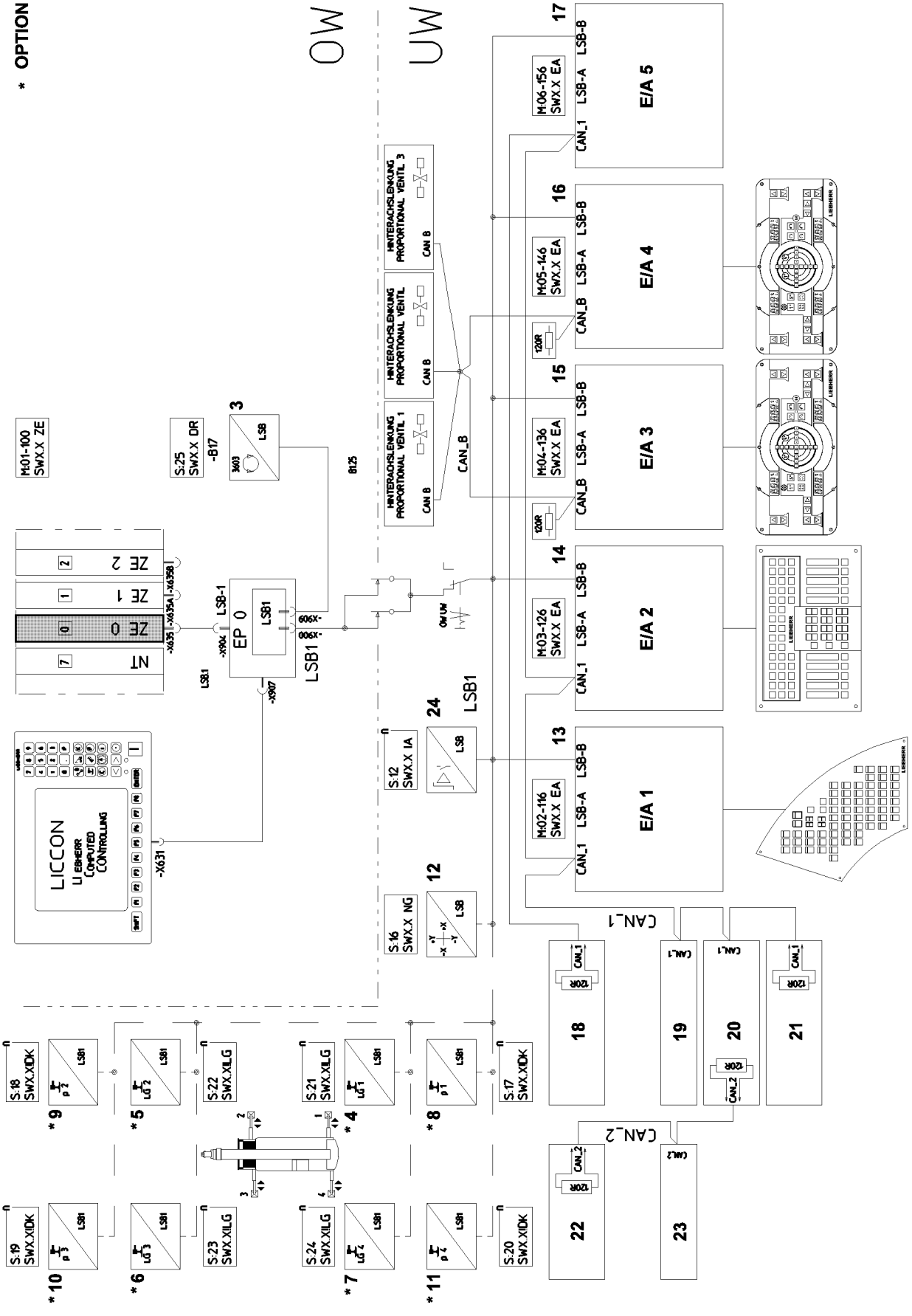

* OPTION
OW
UW
M01-100 SWX.X ZE
S.25 SWX.X DR -B17
3
LSB
B125
HINTERACHSLENKUNG PROPORTIONAL VENTIL 3
HINTERACHSLENKUNG PROPORTIONAL VENTIL
HINTERACHSLENKUNG PROPORTIONAL VENTIL 1
CAN B
CAN_B
ZE 2
ZE 1
ZE 0
NT
-X635 -X635A -X635B
LSB-1
EP 0
LSB1
-X904
-X907
606X-
LSB1
OW/UW
LICCON
LIEBHERR COMPUTED CONTROLLING
-X631
S.12 SWX.X IA
S.16 SWX.X NG
24
12
M03-126 SWX.X EA
M04-136 SWX.X EA
M05-146 SWX.X EA
M06-156 SWX.X EA
M02-116 SWX.X EA
14
15
16
17
13
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
CAN_1 LSB-A LSB-B
CAN_B LSB-A LSB-B
120R
CAN_1
CAN_2
18
19
20
21
22
23
S.18 SWX.XIDK
S.19 SWX.XIDK
S.20 SWX.XIDK
S.17 SWX.XIDK
S.21 SWX.XILG
S.22 SWX.XILG
S.23 SWX.XILG
S.24 SWX.XILG
* 9
* 10
* 5
* 6
* 4
* 7
* 8
* 11

B197877

7 Bus system overview LTM1095-5.1, LTM1100-5.2

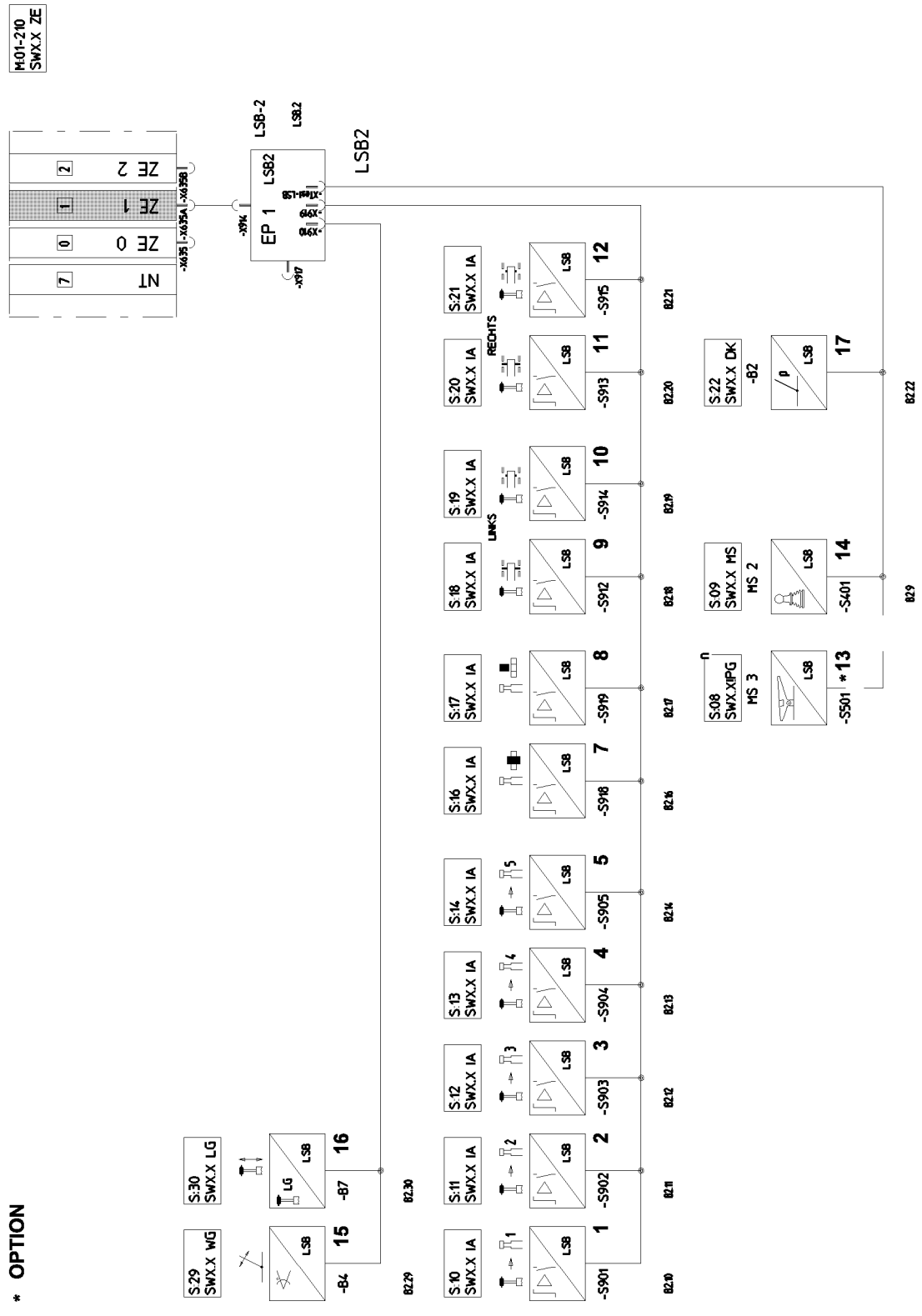
7.1 LSB1 overview

Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	not assigned		
2	not assigned		
3	Shaft encoder (SE)	Direction of boom	25
4	Length sensor (LS)	Sliding beam 1, rear right	21
5	Length sensor (LS)	Sliding beam 2, front right	22
6	Length sensor (LS)	Sliding beam 3, front left	23
7	Length sensor (LS)	Sliding beam 4, rear left	24
8	Pressure sensor (PS)	Support cylinder, rear right	17
9	Pressure sensor (PS)	Support cylinder, front right	18
10	Pressure sensor (PS)	Support cylinder, front left	19
11	Pressure sensor (PS)	Support cylinder, rear left	20
12	Inclination sensor (IS)		16
13	Input/output module 1 (IO) (center console)	Axle suspension, engine, transmission, control functions, keypad unit	2
14	Input/output module 2 (IO) (center console)	Differential locks, display functions, steering - superstructure, display unit	3
15	Input/output module 3 (IO) (right support box)	Right support, concentric running, tank, right support control unit	4


* OPTION
OW
UW
M01-100 SWX.X ZE
S.25 SWX.X DR -B17
3
LSB
B125
HINTERACHSLENKUNG PROPORTIONAL VENTIL 3
HINTERACHSLENKUNG PROPORTIONAL VENTIL
HINTERACHSLENKUNG PROPORTIONAL VENTIL 1
CAN B
CAN_B
ZE 2
ZE 1
ZE 0
NT
-X635 -X635A -X635B
LSB-1
EP 0
LSB1
-X904
-X907
606X-
806X-
LSB1
OW/UW
LICCON
LIEBHERR COMPUTED CONTROLLING
-X631
S.12 SWX.X IA
S.16 SWX.X NG
24
12
M03-126 SWX.X EA
M04-136 SWX.X EA
M05-146 SWX.X EA
M06-156 SWX.X EA
120R
CAN_1
CAN_B
LSB-A
LSB-B
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
13
14
15
16
17
CAN_1
CAN_2
18
19
20
21
22
23
S.18 SWX.XIDK
S.19 SWX.XIDK
S.20 SWX.XIDK
S.17 SWX.XIDK
S.21 SWX.XILG
S.22 SWX.XILG
S.23 SWX.XILG
S.24 SWX.XILG
* 9
* 10
* 5
* 6
* 4
* 7
* 8
* 11

B197877

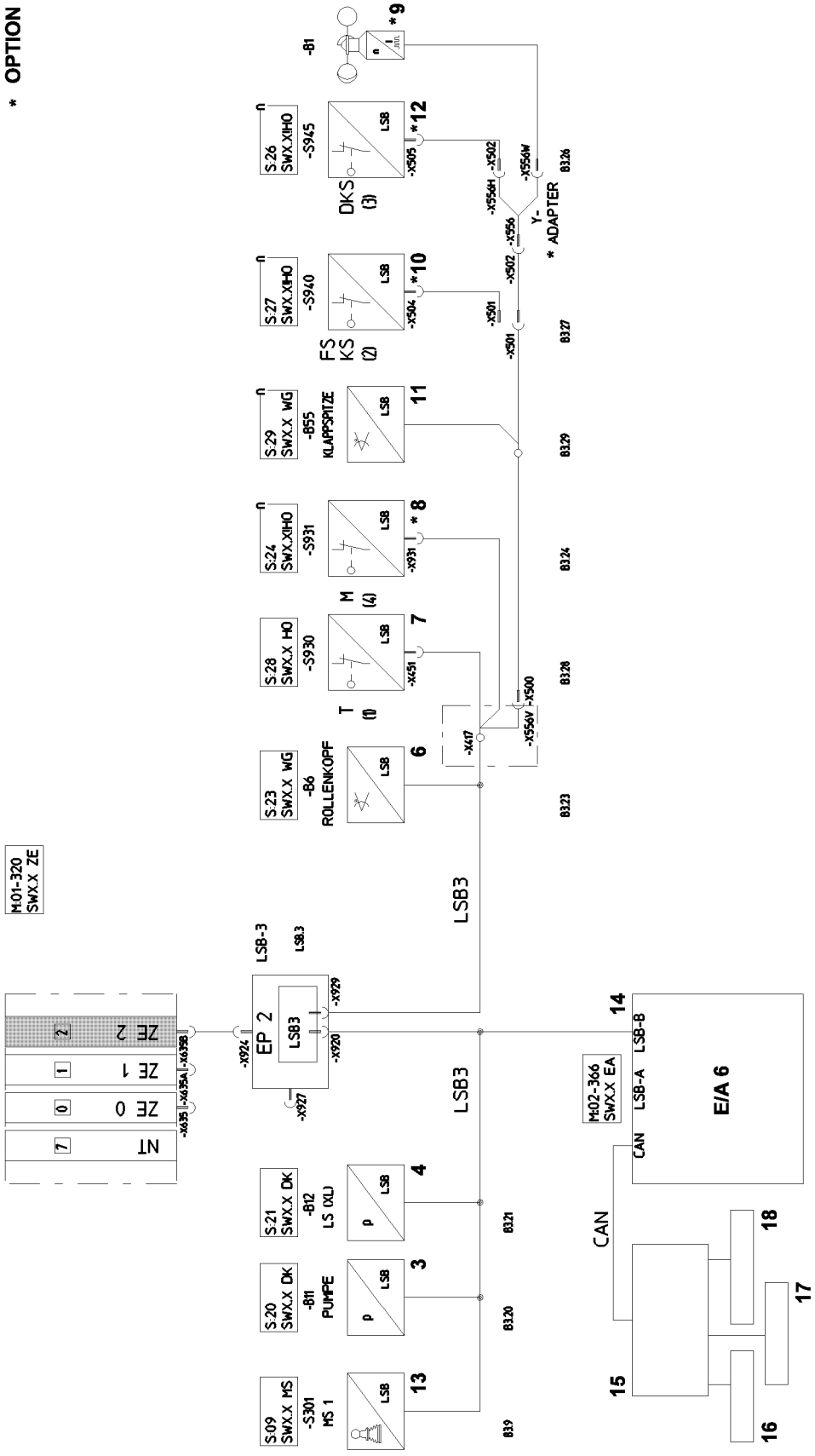
Pos.	Station		Bus address
16	Input/output module 4 (IO) (left support box)	Left support, rear axle steering, left support control unit	5
17	Input/output module 5 (IO) (center console)	Right-hand steering column switch	6
18	Intarder EST-42 (center console)		
19	ABS (center console)		
20	Motor electrical control unit		
21	AS-Tronic transmission		
22	Tachograph		
23	Tacho		
24	Inductive sensor (IS)	Ballast monitoring	12


M:01-210
SWX.X ZE
NT
ZE 0
ZE 1
ZE 2
LSB-2
LSB2
EP 1
LSB2
LSB2
S:29
SWX.X WG
S:30
SWX.X LG
LG
-B4
-B7
S:10
SWX.X IA
S:11
SWX.X IA
S:12
SWX.X IA
S:13
SWX.X IA
S:14
SWX.X IA
S:16
SWX.X IA
S:17
SWX.X IA
S:18
SWX.X IA
S:19
SWX.X IA
S:20
SWX.X IA
S:21
SWX.X IA
LINKS
RECHTS
-S901
-S902
-S903
-S904
-S905
-S906
-S907
-S908
-S909
-S910
-S911
-S912
-S913
-S914
-S915
S:08
SWX.XPG
MS 3
S:09
SWX.X MS
MS 2
-S401
-S501
S:22
SWX.X DK
-B2
-B220
-B221
-B222
* OPTION

B197878

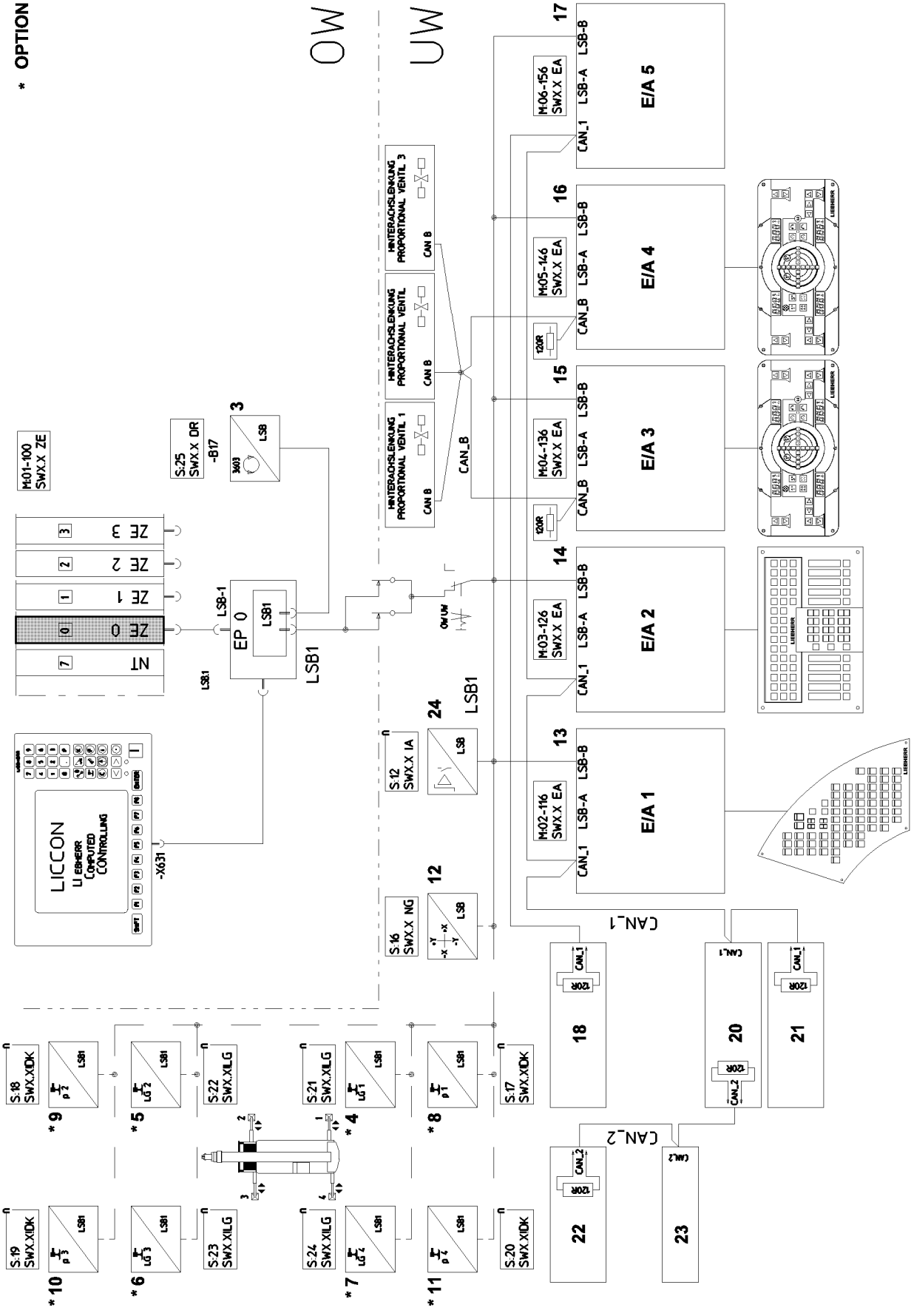
7.2 LSB2 overview

Pos.	Station		Bus address
CPU-1	Central processing unit (CPU) 1 (control cabinet)		1
IPC-B1	Input printed circuit board (IPCB) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
1	Inductive sensor (IS)	Tele pinning 1	10
2	Inductive sensor (IS)	Tele pinning 2	11
3	Inductive sensor (IS)	Tele pinning 3	12
4	Inductive sensor (IS)	Tele pinning 4	13
5	Inductive sensor (IS)	Tele pinning 5	14
6	not assigned		
7	Inductive sensor (IS)	Telescopic boom, pinned	16
8	Inductive sensor (IS)	Telescopic boom, unpinned	17
9	Inductive sensor (IS)	Cylinder pinned, left	18
10	Inductive sensor (IS)	Cylinder unpinned, left	19
11	Inductive sensor (IS)	Cylinder pinned, right	20
12	Inductive sensor (IS)	Cylinder unpinned, right	21
13	Pedal sensor (PS) (MS3)		8
14	Master switch 2 (MS2)		9
15	Angle sensor (AS)	Tele pivot section	29
16	Length sensor (LS)	Telescoping cylinder	30
17	Pressure sensor (PS)	Luffing cylinder, piston surface	22
18	not assigned		
19	not assigned		
20	not assigned		


* OPTION
M:01-320
SWX.X ZE
ZE 2
ZE 1
ZE 0
NT
LSB-3
LSB3
EP 2
LSB3
LSB3
LSB3
S:09
SWX.X MS
-S301
MS 1
S:20
SWX.X DK
-B11
PUMPE
S:21
SWX.X DK
-B12
LS (XL)
S:23
SWX.X WG
-B6
ROLLENKOPF
S:28
SWX.X HO
-S930
T
(1)
S:24
SWX.XOHO
-S931
M
(4)
S:29
SWX.X WG
-B55
KLAPPSPITZE
S:27
SWX.XHO
-S940
FS
KS
(2)
S:26
SWX.XOHO
-S945
DKS
(3)
-B1
Y-
* ADAPTER
M:02-366
SWX.X EA
CAN
LSB-A
LSB-B
E/A 6
CAN
B197879

7.3 LSB3 overview

Pos.	Station		Bus address
CPU-2	Central processing unit (CPU) 2 (control cabinet)		1
IPC-B2	Input printed circuit board (IPCB) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
1	not assigned		
2	not assigned		
3	Pressure sensor (PS)	Pump	20
4	Pressure sensor (PS)	Load signal	21
5	not assigned		
6	Angle sensor (AS)	Pulley head	23
7	Hoist limit switch (HO) 1	Telescopic boom head, left	28
8	Hoist limit switch (HO) 4	Boom nose (2nd HO Tele right)	24
9	Wind sensor		
10	Hoist limit switch (HO) 2		27
11	Angle sensor (AS)	Folding jib	29
12	Hoist limit switch (HO) 3	Dual folding jib	26
13	Master switch 1 (MS1)		9
14	Input/output module 6 (IO)	Cooler drive, ventilation flap, heat flange	2
15	Motor electrical control unit		
16	Ventilation flap		
17	Heat flange		
18	Cooler drive		
19	not assigned		
20	not assigned		

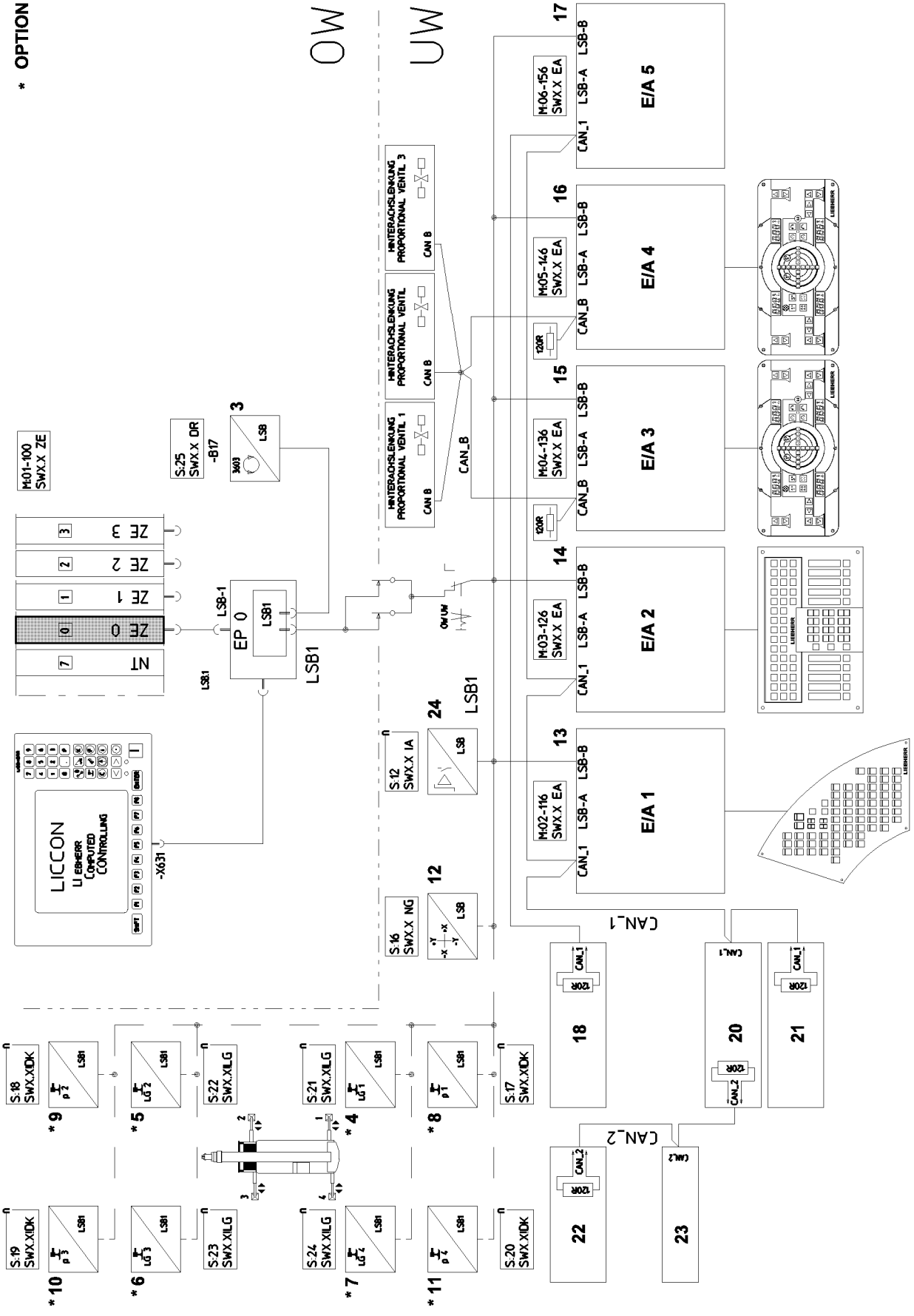

* OPTION
OW
UW
M01-100 SWX.X ZE
ZE 0
ZE 1
ZE 2
ZE 3
NT
S.25 SWX.X DR -B17
3
LSB
LSB-1
EP 0
LSB1
LSB1
LSB1
LICCON
LIEBHERR COMPUTED CONTROLLING
-X631
S.12 SWX.X IA
24
S.16 SWX.X NG
12
HINTERACHSLENKUNG PROPORTIONAL VENTIL 3
HINTERACHSLENKUNG PROPORTIONAL VENTIL
HINTERACHSLENKUNG PROPORTIONAL VENTIL 1
CAN B
CAN_B
M06-156 SWX.X EA
M05-146 SWX.X EA
M04-136 SWX.X EA
M03-126 SWX.X EA
M02-116 SWX.X EA
CAN_1 LSB-A LSB-B
E/A 5
E/A 4
E/A 3
E/A 2
E/A 1
17
16
15
14
13
120R
CAN_1
CAN_2
18
20
21
22
23
S.18 SWX.XDK
S.22 SWX.XLG
S.21 SWX.XLG
S.17 SWX.XDK
S.19 SWX.XDK
S.23 SWX.XLG
S.24 SWX.XLG
S.20 SWX.XDK
* 9
* 5
* 4
* 8
* 10
* 6
* 7
* 11

B102723

8 Bus system overview LTM1130-5.1

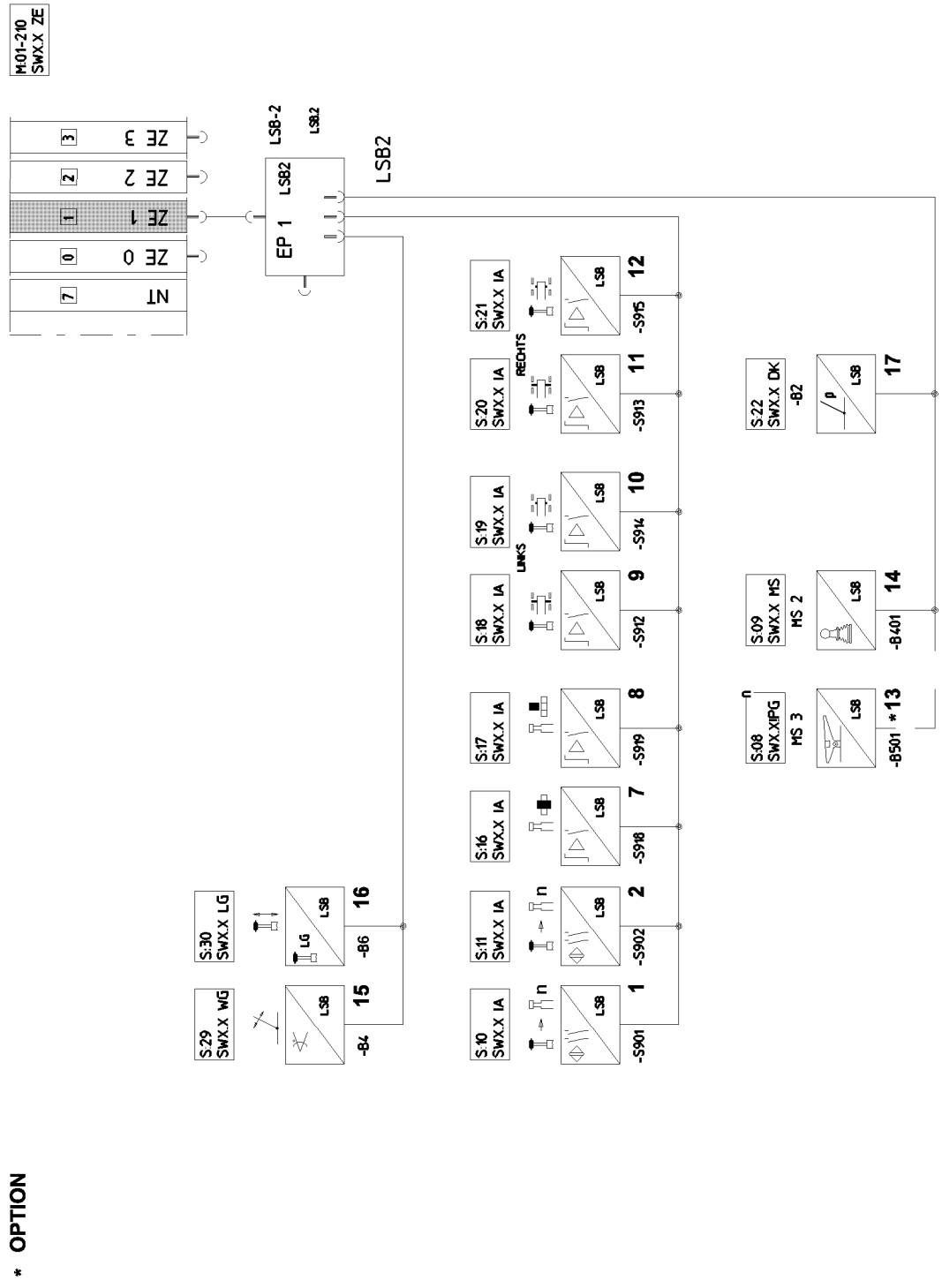
8.1 LSB1 overview

Pos.	Station		Bus address
ZE0	Central processing unit (ZE) 0 (control cabinet)		1
EP0	Input printed circuit board (EP) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	Not assigned		
2	Not assigned		
3	Shaft encoder (DR)	Boom direction	25
4	Length sensor (LG)	Sliding beam 1, right rear	21
5	Length sensor (LG)	Sliding beam 2, front right	22
6	Length sensor (LG)	Sliding beam 3, front left	23
7	Length sensor (LG)	Sliding beam 4, left rear	24
8	Pressure sensor (DK)	Support cylinder, right rear	17
9	Pressure sensor (DK)	Support cylinder, right front	18
10	Pressure sensor (DK)	Support cylinder, left front	19
11	Pressure sensor (DK)	Support cylinder, left rear	20
12	Inclination sensor (NG)		16
13	Input/output module 1 (EA) (center console)	Axle suspension, engine, transmission, control functions, keypad unit	2
14	Input/output module 2 (EA) (center console)	Differential locks, display functions, steering - superstructure, display unit	3
15	Input/output module 3 (EA) (right support box)	Right support, concentric running, tank, right support control unit	4


* OPTION
OW
UW
M01-100 SWX.X ZE
ZE 3
ZE 2
ZE 1
ZE 0
NT
S.25 SWX.X DR -B17
3
LSB
EP 0
LSB-1
LSB1
LSB1
LSB1
LICCON
LIEBHERR COMPUTED CONTROLLING
-X631
S.12 SWX.X IA
24
S.16 SWX.X NG
12
HINTERACHSLENKUNG PROPORTIONAL VENTIL 3
HINTERACHSLENKUNG PROPORTIONAL VENTIL
HINTERACHSLENKUNG PROPORTIONAL VENTIL 1
CAN B
CAN_B
M06-156 SWX.X EA
M05-146 SWX.X EA
M04-136 SWX.X EA
M03-126 SWX.X EA
M02-116 SWX.X EA
CAN_1 LSB-A LSB-B
E/A 5
E/A 4
E/A 3
E/A 2
E/A 1
17
16
15
14
13
120R
CAN_1
CAN_2
CAN_L1
CAN_L2
18
20
21
22
23
S.18 SWX.XIDK
S.19 SWX.XIDK
S.20 SWX.XIDK
S.17 SWX.XIDK
S.22 SWX.XILG
S.23 SWX.XILG
S.21 SWX.XILG
S.24 SWX.XILG
* 9
* 10
* 5
* 6
* 4
* 7
* 8
* 11

B102723

Pos.	Station		Bus address
16	Input/output module 4 (EA) (left support box)	Left support, rear axle steering, left support control unit	5
17	Input/output module 5 (EA) (center console)	Right-hand steering column switch	6
18	Intarder EST-42 (center console)		
19	Not assigned		
20	Motor ECU		
21	AS-Tronic transmission		
22	Tachograph		
23	Tacho		
24	Inductive sensor (IA)	Ballast monitoring	12

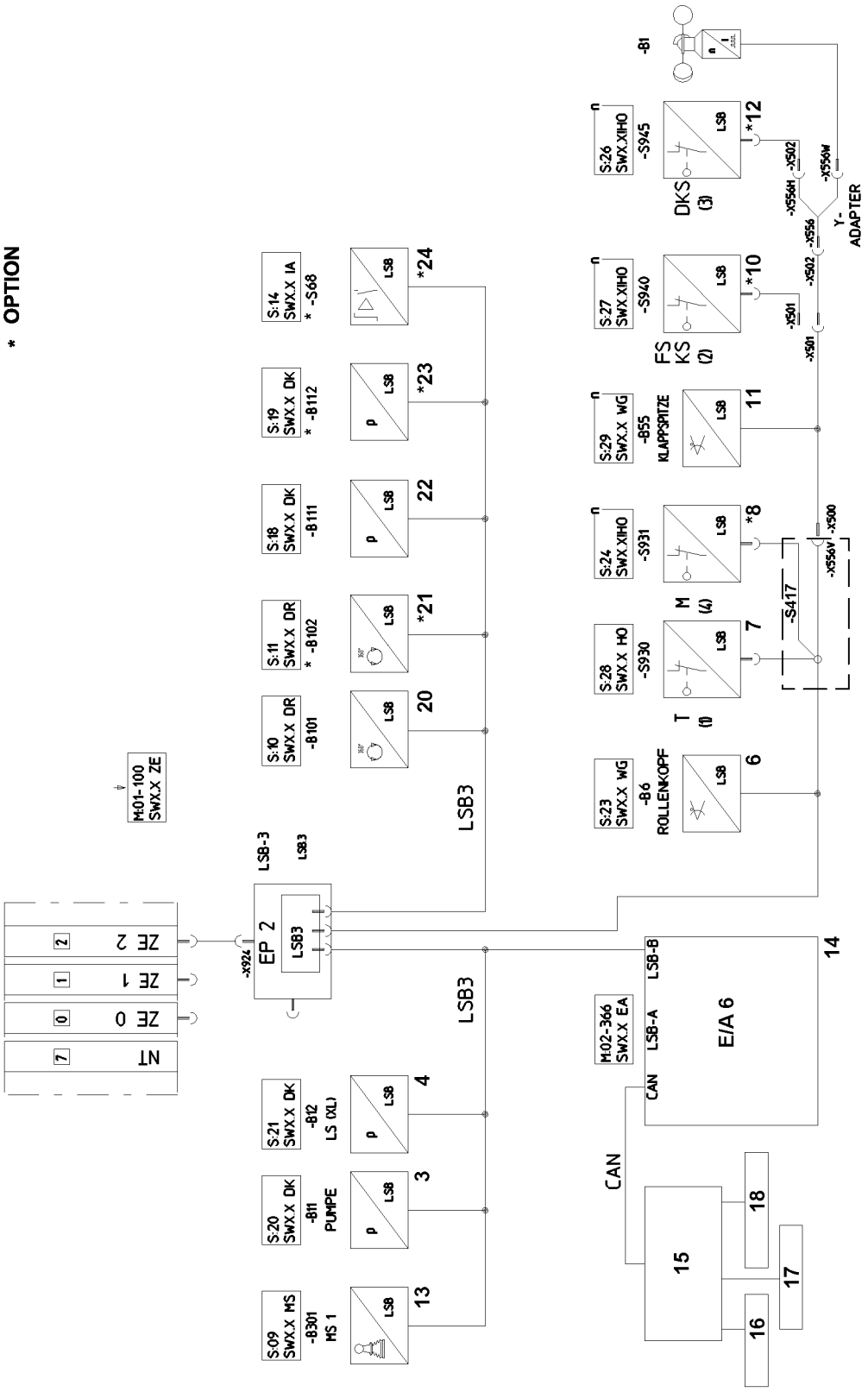


* OPTION

B102724

8.2 LSB2 overview

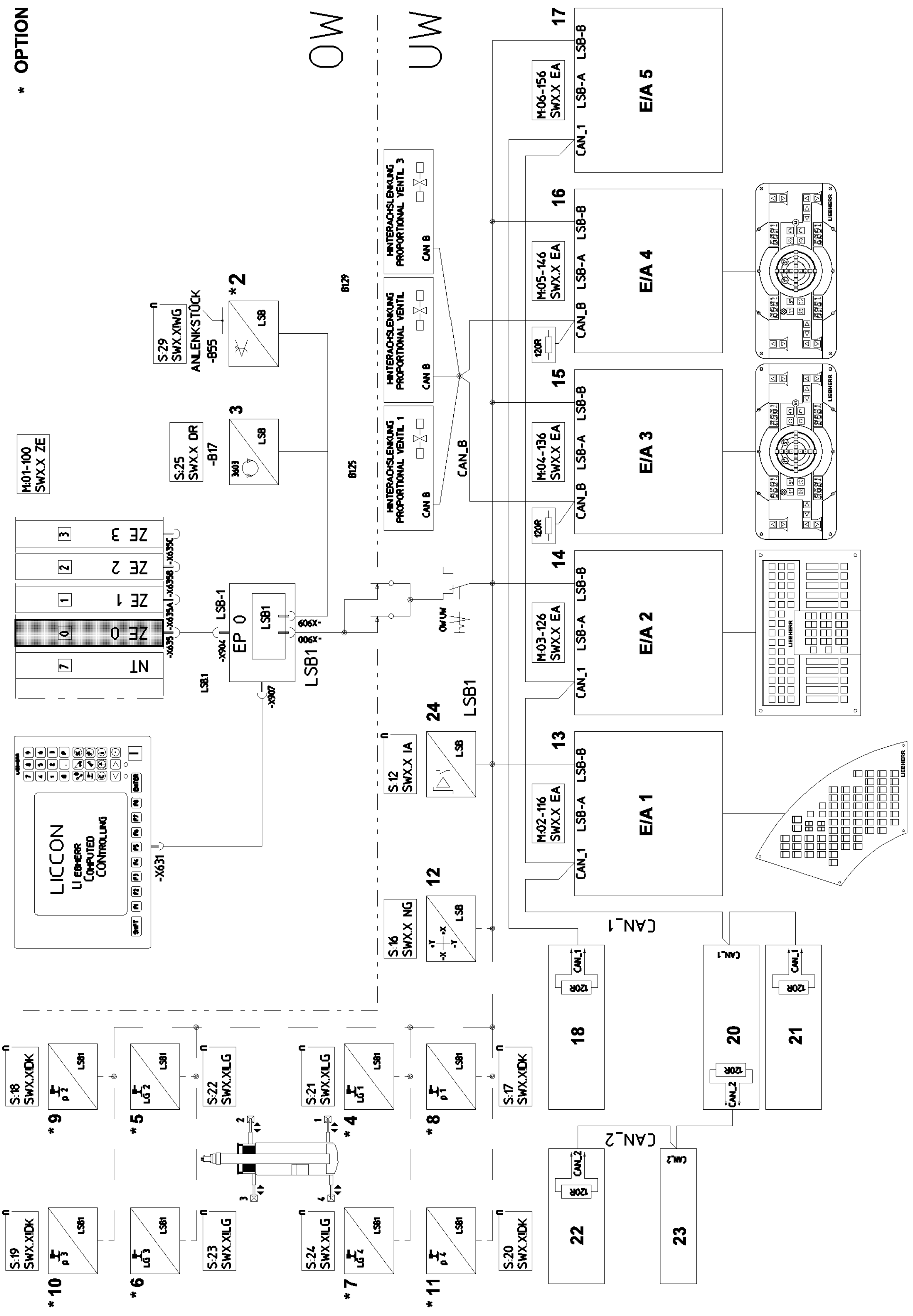
Pos.	Station		Bus address
ZE1	Central processing unit (ZE) 1 (control cabinet)		1
EP1	Input printed circuit board (EP) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
1	Inductive sensor (IA)	Tele pinning (n)	10
2	Inductive sensor (IA)	Tele pinning (n)	11
3	Not assigned		
4	Not assigned		
5	Not assigned		
6	Inductive sensor (IA)	Folding jib swung in / out	26
7	Inductive sensor (IA)	Telescopic boom, pinned	16
8	Inductive sensor (IA)	Telescopic boom, unpinned	17
9	Inductive sensor (IA)	Cylinder pinned, left	18
10	Inductive sensor (IA)	Cylinder unpinned, left	19
11	Inductive sensor (IA)	Cylinder pinned, right	20
12	Inductive sensor (IA)	Cylinder unpinned, right	21
13	Pedal sensor (PG) (MS3)		8
14	Master switch 2 (MS2)		9
15	Angle sensor (WG)	Tele articulated piece	29
16	Length sensor (LG)	Telescoping cylinder	30
17	Pressure sensor (DK)	Luffing cylinder, piston surface	22
18	Pressure sensor (DK)	Pump 4	23


* OPTION
M:01-100 SWX.X ZE
ZE 2
ZE 1
ZE 0
NT
-X924
EP 2
LSB-3
LSB3
LSB3
LSB3
S:09 SWX.X MS -8301 MS 1
S:20 SWX.X DK -811 PUMPE
S:21 SWX.X DK -812 LS (XL)
S:10 SWX.X DR -8101
S:11 SWX.X DR * -8102
S:18 SWX.X DK -8111
S:19 SWX.X DK * -8112
S:14 SWX.X IA * -S68
S:23 SWX.X WG -86 ROLLENKOPF
S:28 SWX.X HO -S930
S:24 SWX.X HO -S931
S:29 SWX.X WG -855 KLAPPSPITZE
S:27 SWX.X HO -S940
S:26 SWX.X HO -S945
-81
DKS (3)
FS KS (2)
T (1)
M (4)
-S417
-X556V
-X500
-X556H
-X502
-X556W
-X556
-X501
Y-ADAPTER
M:02-366 SWX.X EA
CAN
CAN LSB-A LSB-B
E/A 6
14
15
16
17
18
3
4
6
7
11
13
20
22
*21
*23
*24
*10
*12
*8

B102725

8.3 LSB3 overview

Pos.	Station		Bus address
ZE2	Central processing unit (ZE) 2 (control cabinet)		1
EP2	Input printed circuit board (EP) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
1	Not assigned		
2	Not assigned		
3	Pressure sensor (DK)	Pump	20
4	Pressure sensor (DK)	Load signal	21
5	Not assigned		
6	Angle sensor (WG)	Pulley head	23
7	Hoist limit switch (HO) 1	Telescopic boom head, left	28
8	Hoist limit switch (HO) 4	Boom nose (2nd HO Tele right)	24
9	Wind sensor		
10	Hoist limit switch (HO) 2		27
11	Angle sensor (WG)	Folding jib	29
12	Hoist limit switch (HO) 3	Dual folding jib	26
13	Master switch 1 (MS1)		9
14	Input/output module 6 (EA)	Display functions, cooler drive, ventilation flap, heat flange	2
15	Motor ECU		
16	Ventilation flap		
17	Heat flange		
18	Cooling unit drive		
19	Not assigned		
20	Shaft encoder (DR)	Winch 1	10
21	Shaft encoder (DR)	Winch 2	11
22	Pressure sensor (DK)	Winch 1	18
23	Pressure sensor (DK)	Winch 2	19
24	Inductive sensor (IA)	Steep boom	14

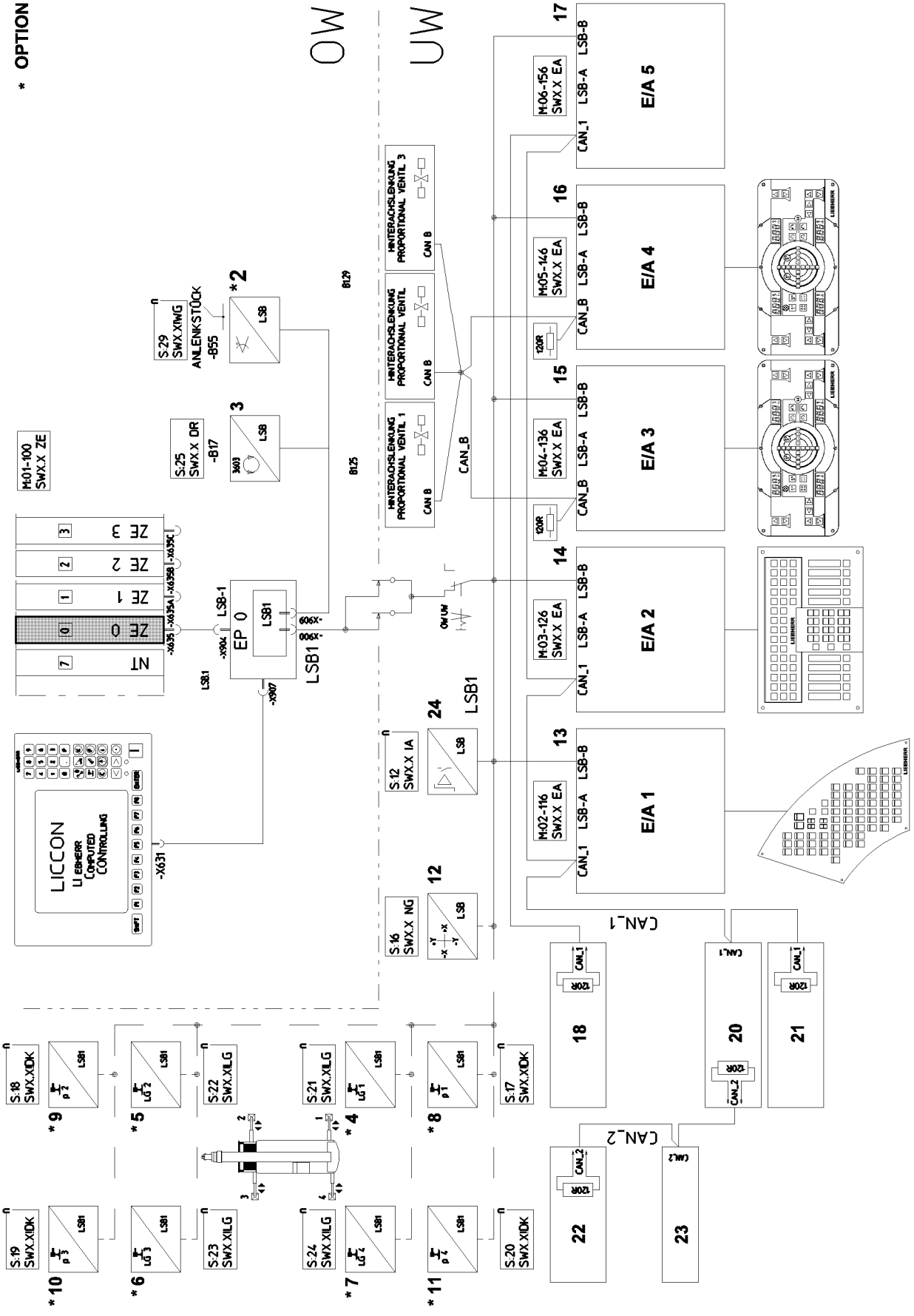

* OPTION
OW
UW
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
LSB-A
LSB-B
CAN_1
CAN_B
CAN_1
CAN_2
M:01-100 SWX.X ZE
M:02-116 SWX.X EA
M:03-126 SWX.X EA
M:04-136 SWX.X EA
M:05-146 SWX.X EA
M:06-156 SWX.X EA
S:12 SWX.X IA
S:16 SWX.X NG
S:25 SWX.X DR
S:29 SWX.X1WG
ANLENKSTÜCK
EP 0
LSB1
ZE 0
ZE 1
ZE 2
ZE 3
NT
LICCON
LIEBHERR COMPUTED CONTROLLING
HINTERACHSLENKUNG PROPORTIONAL VENTIL 1
HINTERACHSLENKUNG PROPORTIONAL VENTIL
HINTERACHSLENKUNG PROPORTIONAL VENTIL 3
S:17 SWX.X1DK
S:18 SWX.X1DK
S:19 SWX.X1DK
S:20 SWX.X1DK
S:21 SWX.X1LG
S:22 SWX.X1LG
S:23 SWX.X1LG
S:24 SWX.X1LG
120R

B102719

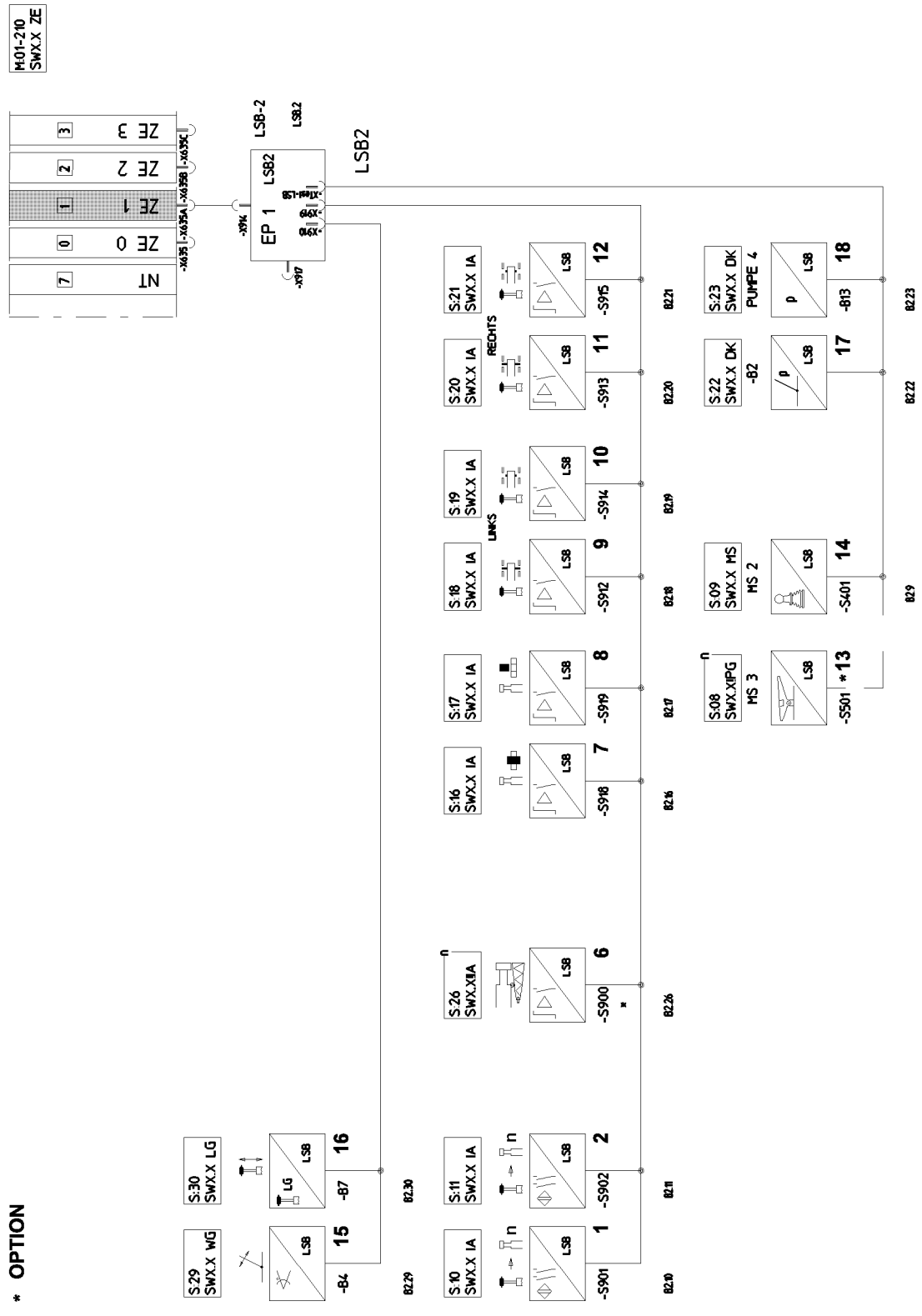
9 Bus system overview LTM1150-5.2, LTM1160-5.1

9.1 LSB1 overview

Pos.	Station		Bus address
ZE0	Central processing unit (ZE) 0 (control cabinet)		1
EP0	Input printed circuit board (EP) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	Not assigned		
2	Angle sensor (WG)	Articulated piece	29
3	Shaft encoder (DR)	Boom direction	25
4	Length sensor (LG)	Sliding beam 1, right rear	21
5	Length sensor (LG)	Sliding beam 2, front right	22
6	Length sensor (LG)	Sliding beam 3, front left	23
7	Length sensor (LG)	Sliding beam 4, left rear	24
8	Pressure sensor (DK)	Support cylinder, right rear	17
9	Pressure sensor (DK)	Support cylinder, right front	18
10	Pressure sensor (DK)	Support cylinder, left front	19
11	Pressure sensor (DK)	Support cylinder, left rear	20
12	Inclination sensor (NG)		16
13	Input/output module 1 (EA) (center console)	Axle suspension, engine, transmission, control functions, keypad unit	2
14	Input/output module 2 (EA) (center console)	Differential locks, display functions, steering - superstructure, display unit	3
15	Input/output module 3 (EA) (right support box)	Right support, concentric running, tank, right support control unit	4


* OPTION
OW
UW
LICCON
LIEBHERR COMPUTED CONTROLLING
EP 0
LSB1
LSB-1
M01-100 SWX.X ZE
S.25 SWX.X DR -817
S.29 SWX.XWG ANLENKSTOCK -855
S.12 SWX.X IA
S.16 SWX.X NG
S.17 SWX.XDK
S.18 SWX.XDK
S.19 SWX.XDK
S.20 SWX.XDK
S.21 SWX.XLG
S.22 SWX.XLG
S.23 SWX.XLG
S.24 SWX.XLG
HINTERACHSLENKUNG PROPORTIONAL VENTIL 1
HINTERACHSLENKUNG PROPORTIONAL VENTIL
HINTERACHSLENKUNG PROPORTIONAL VENTIL 3
CAN_B
CAN_1
CAN_2
120R
M02-116 SWX.X EA
M03-126 SWX.X EA
M04-136 SWX.X EA
M05-146 SWX.X EA
M06-156 SWX.X EA
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
ZE 0
ZE 1
ZE 2
ZE 3
NT
-X631
-X635
-X635A
-X635B
-X635C
-X904
-X907
606X-
806X-
B102719

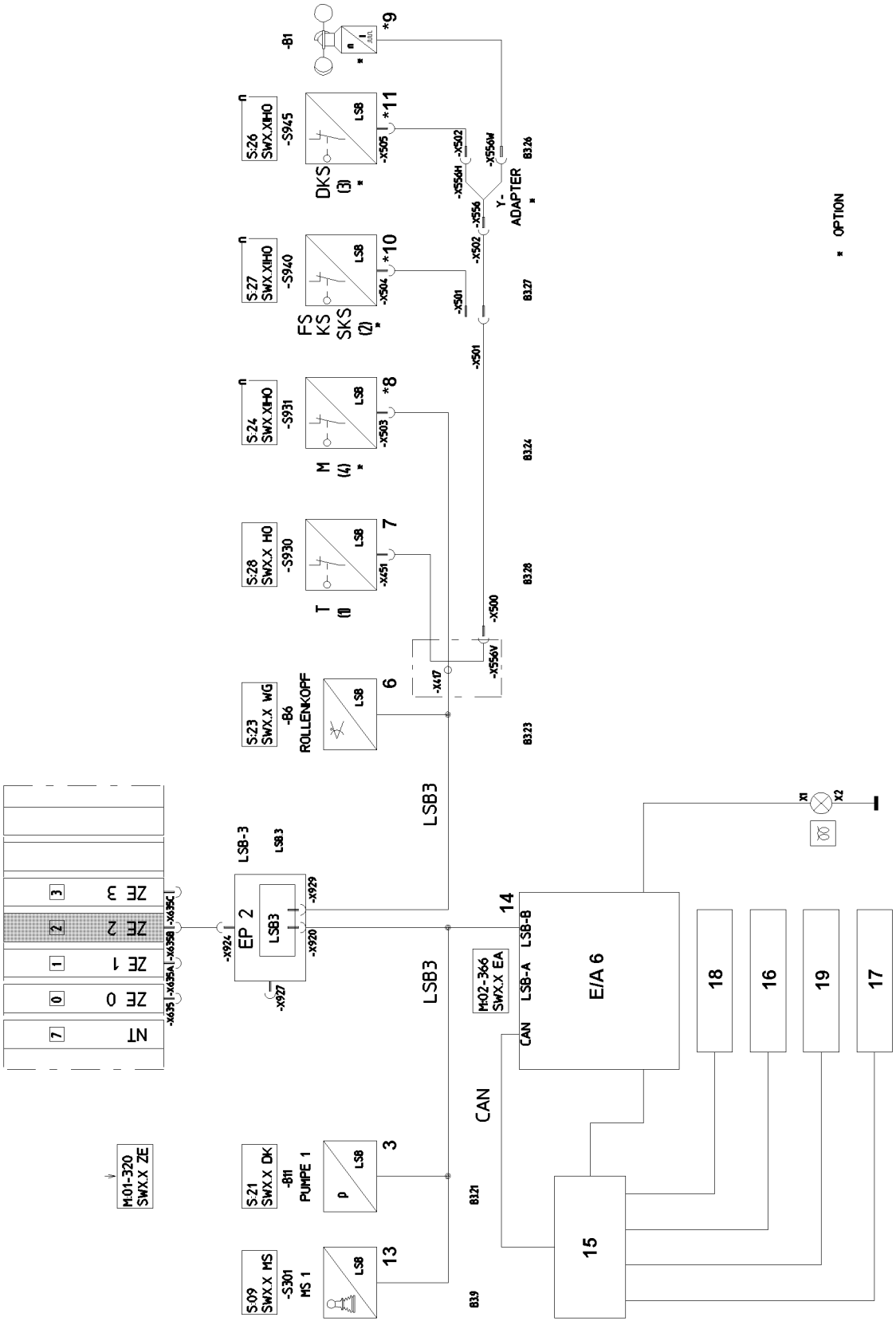
Pos.	Station		Bus address
16	Input/output module 4 (EA) (left support box)	Left support, rear axle steering, left support control unit	5
17	Input/output module 5 (EA) (center console)	Right-hand steering column switch	6
18	Intarder EST-42 (center console)		
19	Not assigned		
20	Motor ECU		
21	AS-Tronic transmission		
22	Tachograph		
23	Tacho		
24	Inductive sensor (IA)	Ballast monitoring	12


M:01-210
SWX.X ZE
ZE 3
ZE 2
ZE 1
ZE 0
NT
LSB-2
LSB2
EP 1
LSB2
S:29
SWX.X WG
S:30
SWX.X LG
S:10
SWX.X IA
S:11
SWX.X IA
S:26
SWX.X3A
S:16
SWX.X IA
S:17
SWX.X IA
S:18
SWX.X IA
S:19
SWX.X IA
S:20
SWX.X IA
S:21
SWX.X IA
S:08
SWX.XPG
MS 3
S:09
SWX.X MS
MS 2
S:22
SWX.X DK
-B2
S:23
SWX.X DK
PUMPE 4
LINKS
RECHTS
LSB
LG
-S901
-S902
-S900
-S916
-S999
-S912
-S914
-S913
-S915
-S501
-S401
-B4
-B7
-B13
1
2
6
7
8
9
10
11
12
13
14
15
16
17
18
B210
B211
B226
B216
B217
B218
B219
B220
B221
B229
B230
B222
B223
B29
* OPTION

B102720

9.2 LSB2 overview

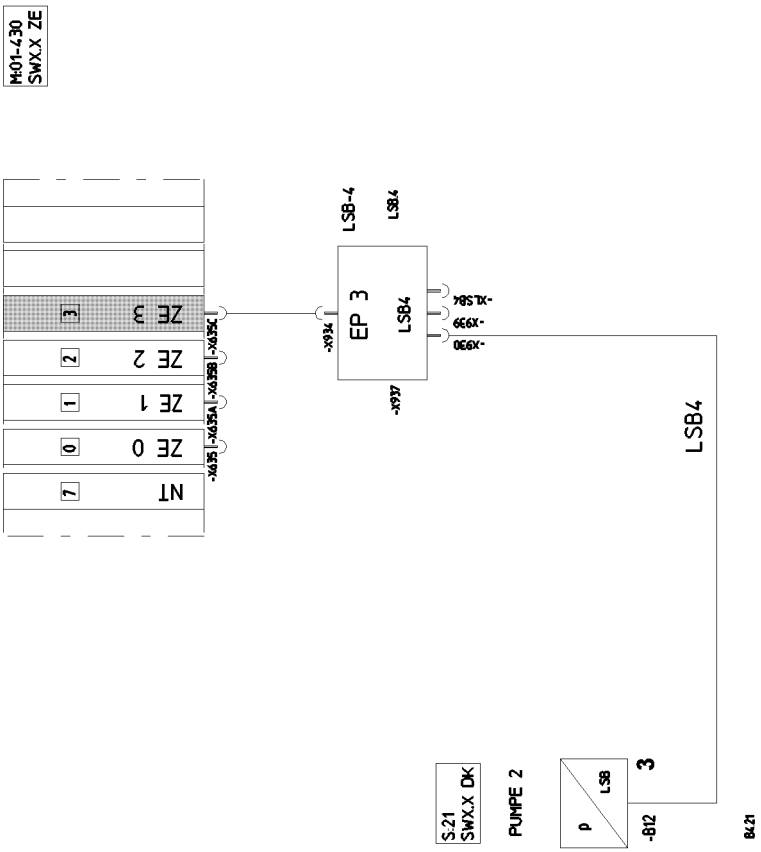
Pos.	Station		Bus address
ZE1	Central processing unit (ZE) 1 (control cabinet)		1
EP1	Input printed circuit board (EP) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
1	Inductive sensor (IA)	Tele pinning (n)	10
2	Inductive sensor (IA)	Tele pinning (n)	11
3	Not assigned		
4	Not assigned		
5	Not assigned		
6	Inductive sensor (IA)	Folding jib swung in / out	26
7	Inductive sensor (IA)	Telescopic boom, pinned	16
8	Inductive sensor (IA)	Telescopic boom, unpinned	17
9	Inductive sensor (IA)	Cylinder pinned, left	18
10	Inductive sensor (IA)	Cylinder unpinned, left	19
11	Inductive sensor (IA)	Cylinder pinned, right	20
12	Inductive sensor (IA)	Cylinder unpinned, right	21
13	Pedal sensor (PG) (MS3)		8
14	Master switch 2 (MS2)		9
15	Angle sensor (WG)	Tele articulated piece	29
16	Length sensor (LG)	Telescoping cylinder	30
17	Pressure sensor (DK)	Luffing cylinder, piston surface	22
18	Pressure sensor (DK)	Pump 4	23
19	Not assigned		
20	Not assigned		


-B1
*9
S:26 SWX.XHO -S945
*11
DKS (3) *
-X505
-X502
-X556W
-X556H
-X554
Y-ADAPTER
B326
S:27 SWX.XHO -S940
*10
FS KS SKS (2) *
-X504
-X501
B327
S:24 SWX.XHO -S931
*8
M (4) *
-X503
B324
S:28 SWX.X HO -S930
7
T (1) *
-X451
B328
-X500
-X556V
S:23 SWX.X WG -B6 ROLLENKOPF
6
-X417
B323
LSB3
LSB-3
EP 2
-X924
-X929
-X920
-X927
14
LSB-A LSB-B
E/A 6
CAN
MK02-366 SWX.X EA
18
16
19
17
X1
X2
ZE 3
ZE 2
ZE 1
ZE 0
NT
-X635C
-X635B
-X635A
-X635
M01-320 SWX.X ZE
S:21 SWX.X DK -B11 PUMPE 1
3
B321
CAN
S:09 SWX.X MS -S301 MS 1
13
B39
15
* OPTION

B102721

9.3 LSB3 overview

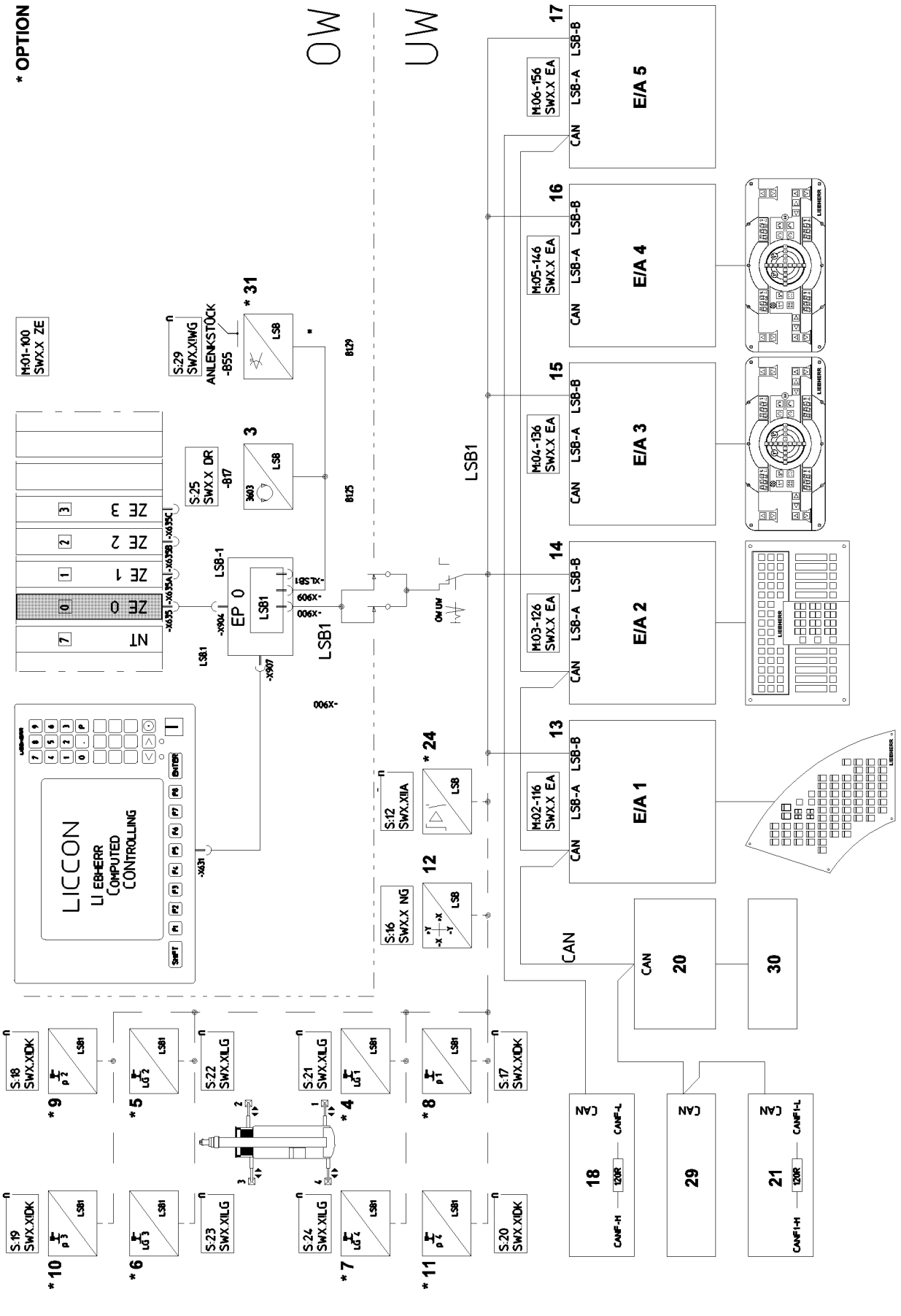
Pos.	Station		Bus address
ZE2	Central processing unit (ZE) 2 (control cabinet)		1
EP2	Input printed circuit board (EP) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
1	Not assigned		
2	Not assigned		
3	Pressure sensor (DK)	Pump 1	21
4	Not assigned		
5	Not assigned		
6	Angle sensor (WG)	Pulley head	23
7	Hoist limit switch (HO) 1	Telescopic boom head, left	28
8	Hoist limit switch (HO) 4	Boom nose (2nd HO Tele right)	24
9	Wind sensor		
10	Hoist limit switch (HO) 2	Fixed lattice jib, folding jib, special folding jib	27
11	Hoist limit switch (HO) 3	Dual folding jib	26
12	Not assigned		
13	Master switch 1 (MS1)		9
14	Input/output module 6 (EA)	Cooler drive, ventilation flap, heat flange, exhaust flap	2
15	Electrical control unit		
16	Ventilation flap		
17	Heat flange		
18	Cooling unit drive		
19	Exhaust flap		
20	Not assigned		


M:01-430
SWX.X ZE
ZE 3
ZE 2
ZE 1
ZE 0
NT
LSB-4
LSB4
EP 3
LSB4
LSB4
S.21
SWX.X DK
PUMPE 2
LSB
3
-812
8421

B102722

9.4 LSB4 overview

Pos.	Station		Bus address
ZE3	Central processing unit (ZE) 3 (control cabinet)		1
EP3	Input printed circuit board (EP) 3 (control cabinet)		
LSB4	LIEBHERR-System-Bus 4		
1	Not assigned		
2	Not assigned		
3	Pressure sensor (DK)	Pump 2	21
4	Not assigned		
5	Not assigned		
6	Not assigned		
7	Not assigned		
8	Not assigned		
9	Not assigned		
10	Not assigned		

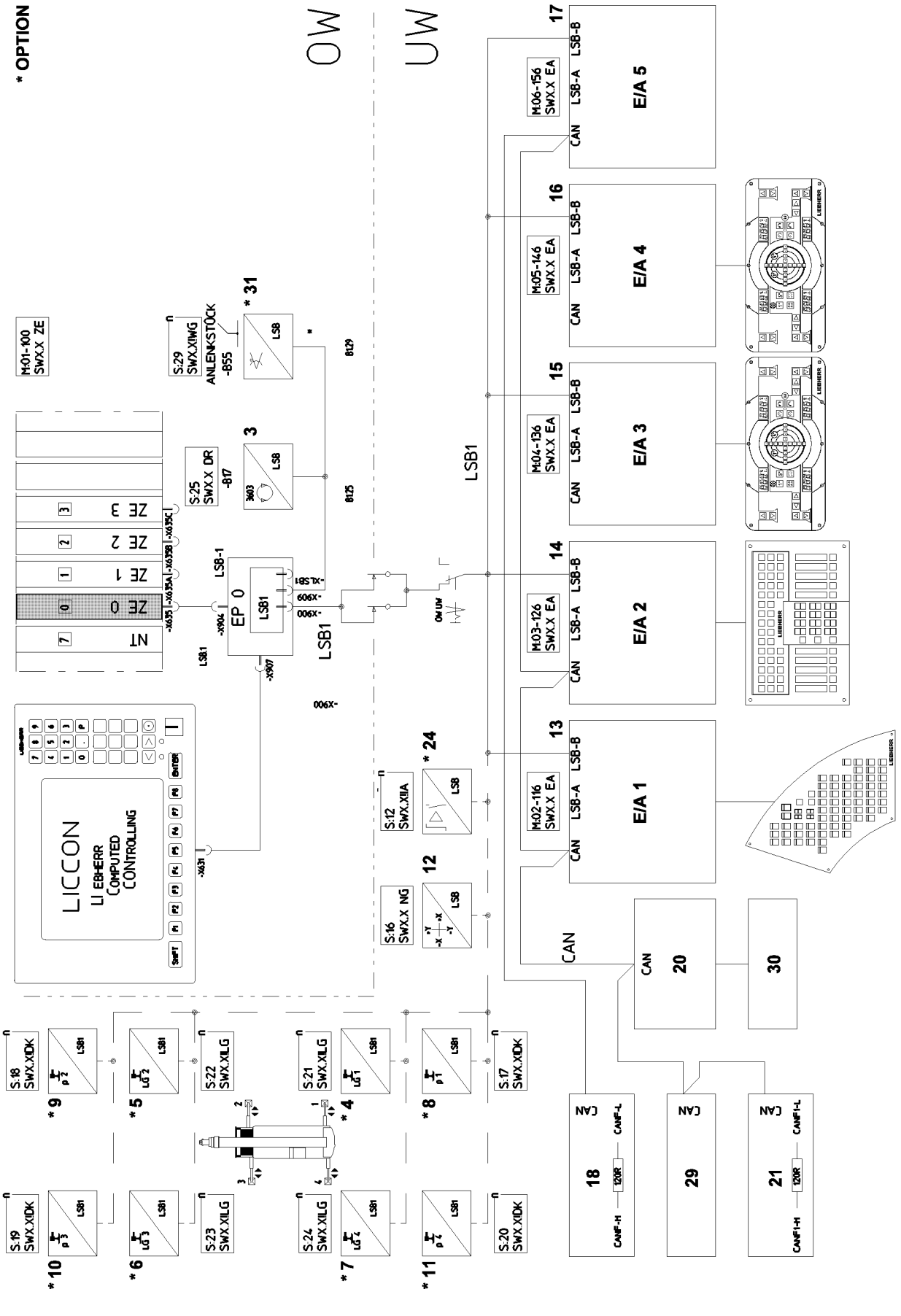

* OPTION
OW
UW
LSB1
M:01-100
SWX.X ZE
ZE 3
ZE 2
ZE 1
ZE 0
NT
S:25
SWX.X DR
-817
S:29
SWX.XIWG
ANLENKSTÖCK
-855
LSB-1
EP 0
LSB1
LSB
LICCON
LI EBHERR
COMPUTED
CONTROLLING
S:12
SWX.XIIA
S:16
SWX.X NG
M:02-116
SWX.X EA
M:03-126
SWX.X EA
M:04-136
SWX.X EA
M:05-146
SWX.X EA
M:06-156
SWX.X EA
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
CAN
LSB-A
LSB-B
S:17
SWX.XDK
S:18
SWX.XDK
S:19
SWX.XDK
S:20
SWX.XDK
S:21
SWX.XLG
S:22
SWX.XLG
S:23
SWX.XLG
S:24
SWX.XLG
CANF-H
CANF-L
120R

B198544

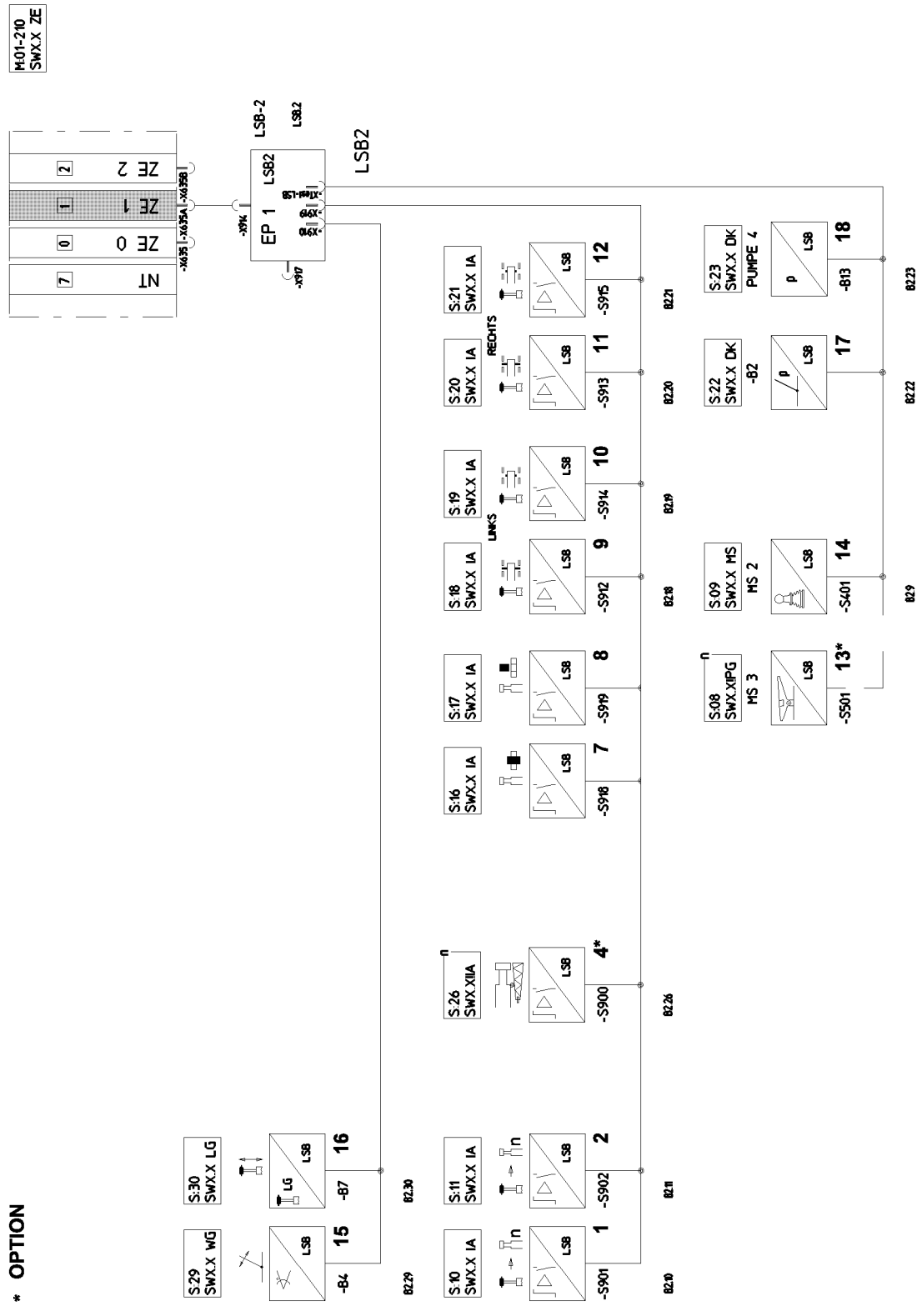
10 Bus system overview LTM1200-5.1

10.1 LSB1 overview

Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	not assigned		
2	not assigned		
3	Shaft encoder (SE)	Direction of boom	25
4	Length sensor (LS)	Sliding beam 1, rear right	21
5	Length sensor (LS)	Sliding beam 2, front right	22
6	Length sensor (LS)	Sliding beam 3, front left	23
7	Length sensor (LS)	Sliding beam 4, rear left	24
8	Pressure sensor (PS)	Support cylinder, rear right	17
9	Pressure sensor (PS)	Support cylinder, front right	18
10	Pressure sensor (PS)	Support cylinder, front left	19
11	Pressure sensor (PS)	Support cylinder, rear left	20
12	Inclination sensor (IS)		16
13	Input/output module 1 (IO) (center console)	Axle suspension, engine, transmission, control functions, keypad unit	2
14	Input/output module 2 (IO) (center console)	Differential locks, display functions, display unit	3
15	Input/output module 3 (IO) (right support box)	Right support, concentric running, tank, right support control unit	4


* OPTION
OW
UW
LSB1
M:01-100 SWXX ZE
S:29 SWXXIWG ANLENKSTÖCK -855
S:25 SWX.X DR -817
S:12 SWX.XIIA
S:16 SWX.X NG
M:02-116 SWX.X EA
M:03-126 SWX.X EA
M:04-136 SWX.X EA
M:05-146 SWX.X EA
M:06-156 SWX.X EA
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
LSB-A LSB-B
CAN
LSB1
EP 0
ZE 0
ZE 1
ZE 2
ZE 3
NT
LICCON
LI EBHERR
COMPUTED
CONTROLLING
CANF-H
CANF-L
120R
B198544

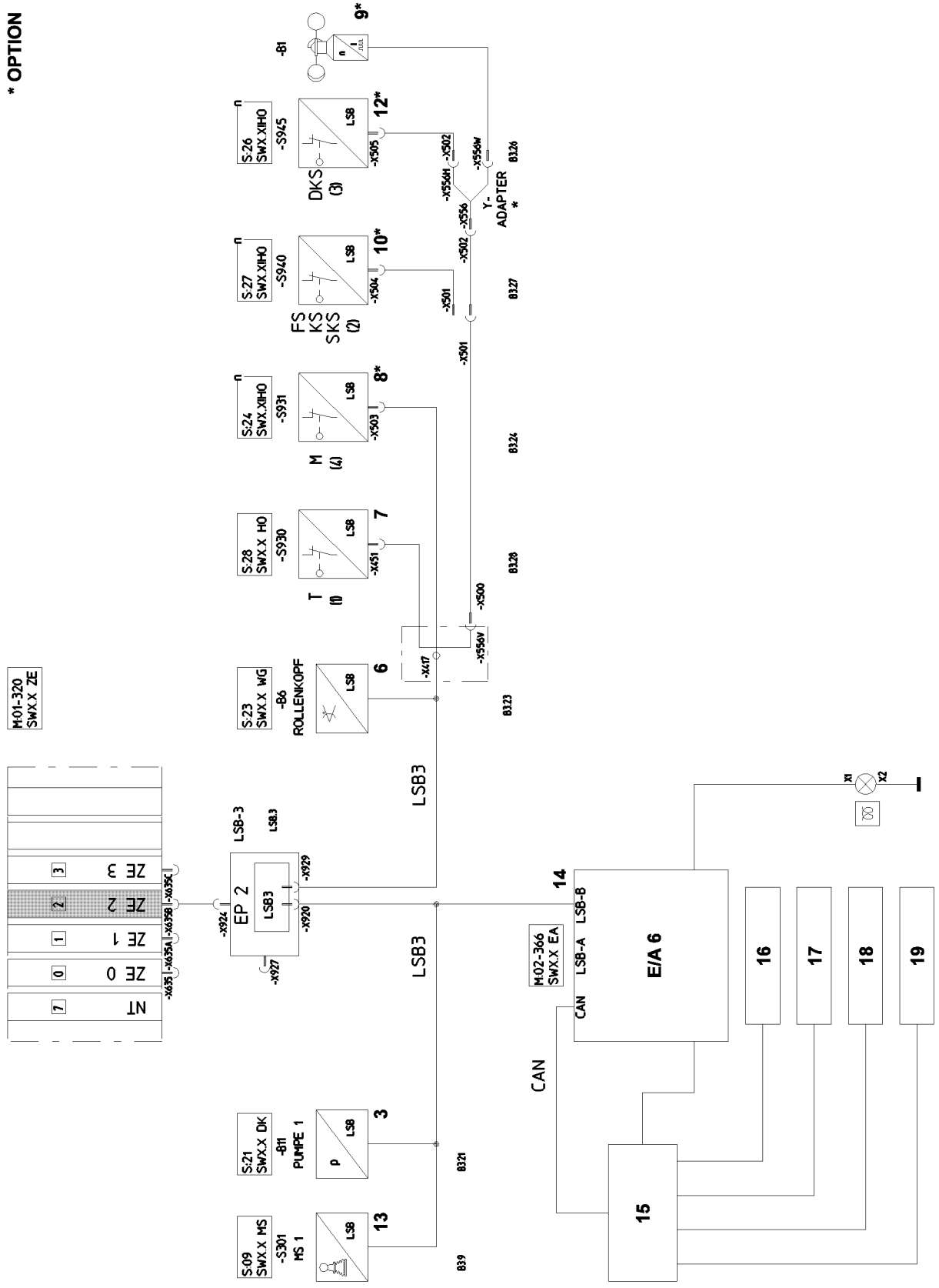
Pos.	Station		Bus address
16	Input/output module 4 (IO) (left support box)	Left support, rear axle steering, left support control unit	5
17	Input/output module 5 (IO) (center console)	Right-hand steering column switch	6
18	Intarder EST-42 (center console)		
19	not assigned		
20	Motor electrical control unit		
21	AS-Tronic transmission		
22	not assigned		
23	not assigned		
24	Inductive sensor (IS)	Ballast monitoring (brake force reduction)	12
25	not assigned		
26	not assigned		
27	not assigned		
28	not assigned		
29	Wheel speed (center console)		
30	Engine flame starting device		
31	Folding jib - articulated piece		


M:01-210
SWX.X ZE
ZE 2
ZE 1
ZE 0
NT
LSB-2
LSB2
EP 1
LSB2
S:29
SWX.X WG
S:30
SWX.X LG
S:10
SWX.X IA
S:11
SWX.X IA
S:16
SWX.X IA
S:17
SWX.X IA
S:18
SWX.X IA
S:19
SWX.X IA
S:20
SWX.X IA
S:21
SWX.X IA
S:26
SWX.X IA
S:08
SWX.X PG
MS 3
S:09
SWX.X MS
MS 2
S:22
SWX.X DK
-B2
S:23
SWX.X DK
PUMPE 4
LINKS
RECHTS
LSB
LG
-B4
-B7
-B13
-S901
-S902
-S900
-S918
-S999
-S912
-S914
-S913
-S915
-S501
-S401
1
2
4*
7
8
9
10
11
12
13*
14
15
16
17
18
B229
B230
B210
B211
B226
B218
B219
B220
B221
B222
B223
B229
* OPTION

B198545

10.2 LSB2 overview

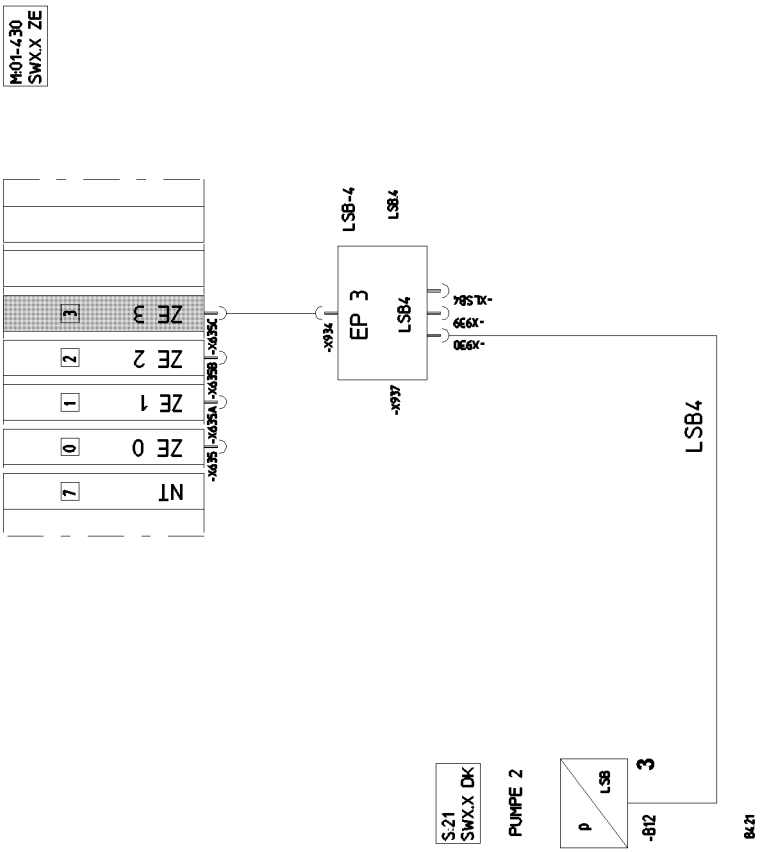
Pos.	Station		Bus address
CPU-1	Central processing unit (CPU) 1 (control cabinet)		1
IPC-B1	Input printed circuit board (IPCB) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
1	Inductive sensor (IS)	Tracking sensor, right	10
2	Inductive sensor (IS)	Tracking sensor, left	11
3	not assigned		
4	Inductive sensor (IS)	Folding jib	26
5	not assigned		
6	not assigned		
7	Inductive sensor (IS)	Telescopic boom, pinned	16
8	Inductive sensor (IS)	Telescopic boom, unpinned	17
9	Inductive sensor (IS)	Cylinder pinned, left	18
10	Inductive sensor (IS)	Cylinder unpinned, left	19
11	Inductive sensor (IS)	Cylinder pinned, right	20
12	Inductive sensor (IS)	Cylinder unpinned, right	21
13	Pedal sensor (PS) (MS3)		8
14	Master switch 2 (MS2)		9
15	Angle sensor (AS)	Tele pivot section	29
16	Length sensor (LS)	Telescoping cylinder	30
17	Pressure sensor (PS)	Luffing cylinder, piston surface	22
18	Pressure sensor (PS)	Pump 4	23


* OPTION
M01-320
SWX.X ZE
NT
ZE 0
ZE 1
ZE 2
ZE 3
-X635
-X635A
-X635B
-X635C
LSB-3
LSB3
EP 2
-X924
-X927
-X929
-X920
LSB3
LSB3
S:23
SWX.X WG
-B6
ROLLENKOPF
6
-X417
-X500
-X556V
S:28
SWX.X HO
-S930
T
(1)
7
-X451
S:24
SWX.XIHO
-S931
M
(4)
8*
-X503
S:27
SWX.XIHO
-S940
FS
KS
SKS
(2)
10*
-X504
-X501
-X501
S:26
SWX.XIHO
-S945
DKS
(3)
12*
-X505
-X556H
-X502
-X556W
-X556
Y-
ADAPTER
*
-B1
9*
S:21
SWX.X DK
-B11
PUMPE 1
3
S:09
SWX.X MS
-S301
MS 1
13
M02-366
SWX.X EA
14
CAN
LSB-A
LSB-B
E/A 6
CAN
15
16
17
18
19
X1
X2
B326
B327
B324
B326
B323
B321
B39

B198546

10.3 LSB3 overview

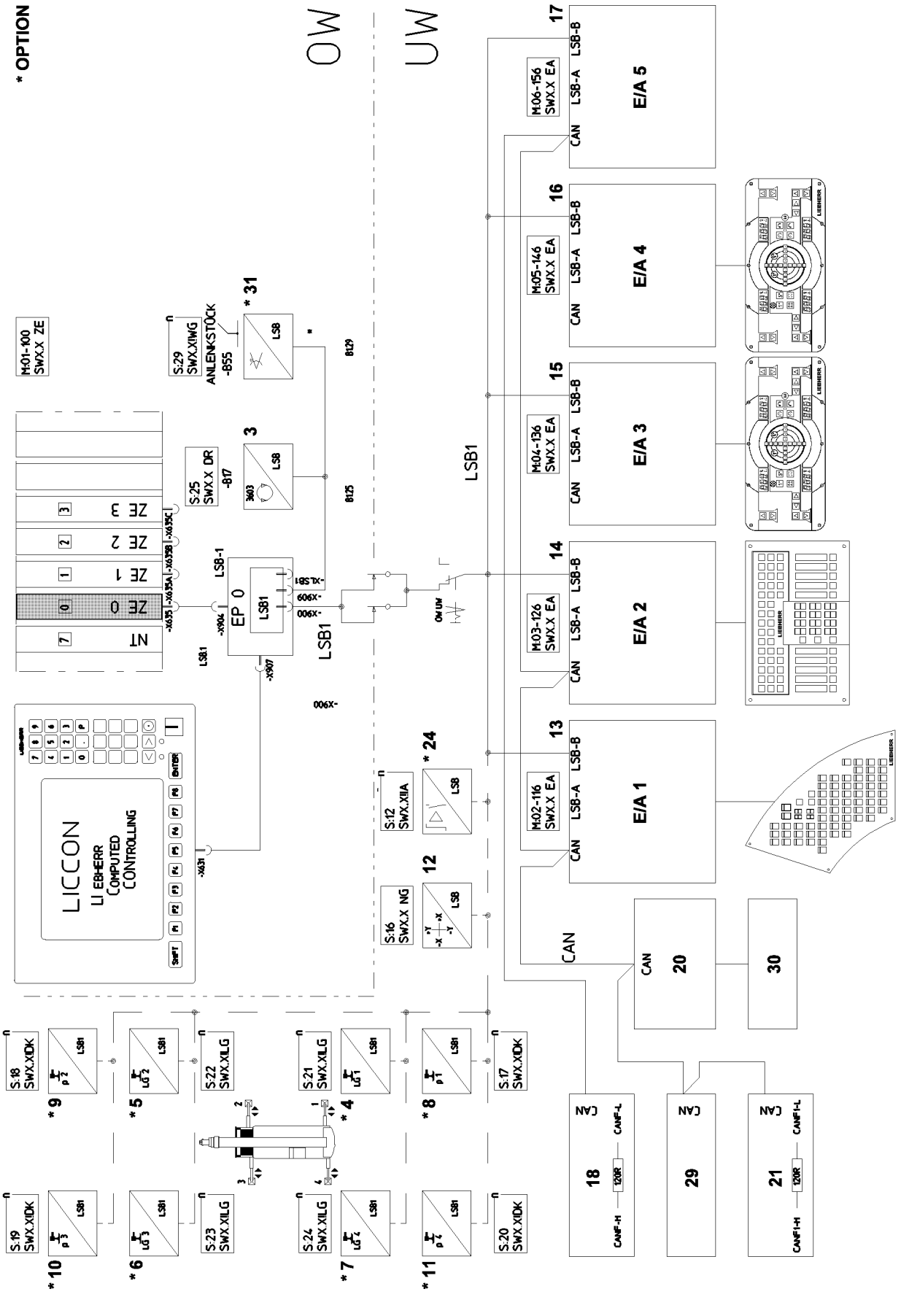
Pos.	Station		Bus address
CPU-2	Central processing unit (CPU) 2 (control cabinet)		1
IPC-B2	Input printed circuit board (IPCB) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
1	not assigned		
2	not assigned		
3	Pressure sensor (PS)	Pump 1	21
4	not assigned		
5	not assigned		
6	Angle sensor (AS)	Pulley head	23
7	Hoist limit switch (HO) 1	Telescopic boom head, right	28
8	Hoist limit switch (HO) 4	Boom nose (2nd HO Tele left)	24
9	Wind sensor		
10	Hoist limit switch (HO) 2	Single folding jib, (roller set, special folding jib)	27
11	not assigned		
12	Hoist limit switch (HO) 3	Dual folding jib	26
13	Master switch 1 (MS1)		9
14	Input/output module 6 (IO)	Cooler drive, ventilation flaps, exhaust flap retention straps, heat flange	2
15	Electrical control unit		
16	Cooler drive		
17	Ventilation flap		
18	Exhaust flap retention strap		
19	Heat flange		


M:01-430
SWX.X ZE
ZE 3
ZE 2
ZE 1
ZE 0
NT
LSB-4
LSB4
EP 3
LSB4
LSB4
S.21
SWX.X DK
PUMPE 2
LSB
-812
3
8421

B198547

10.4 LSB4 overview

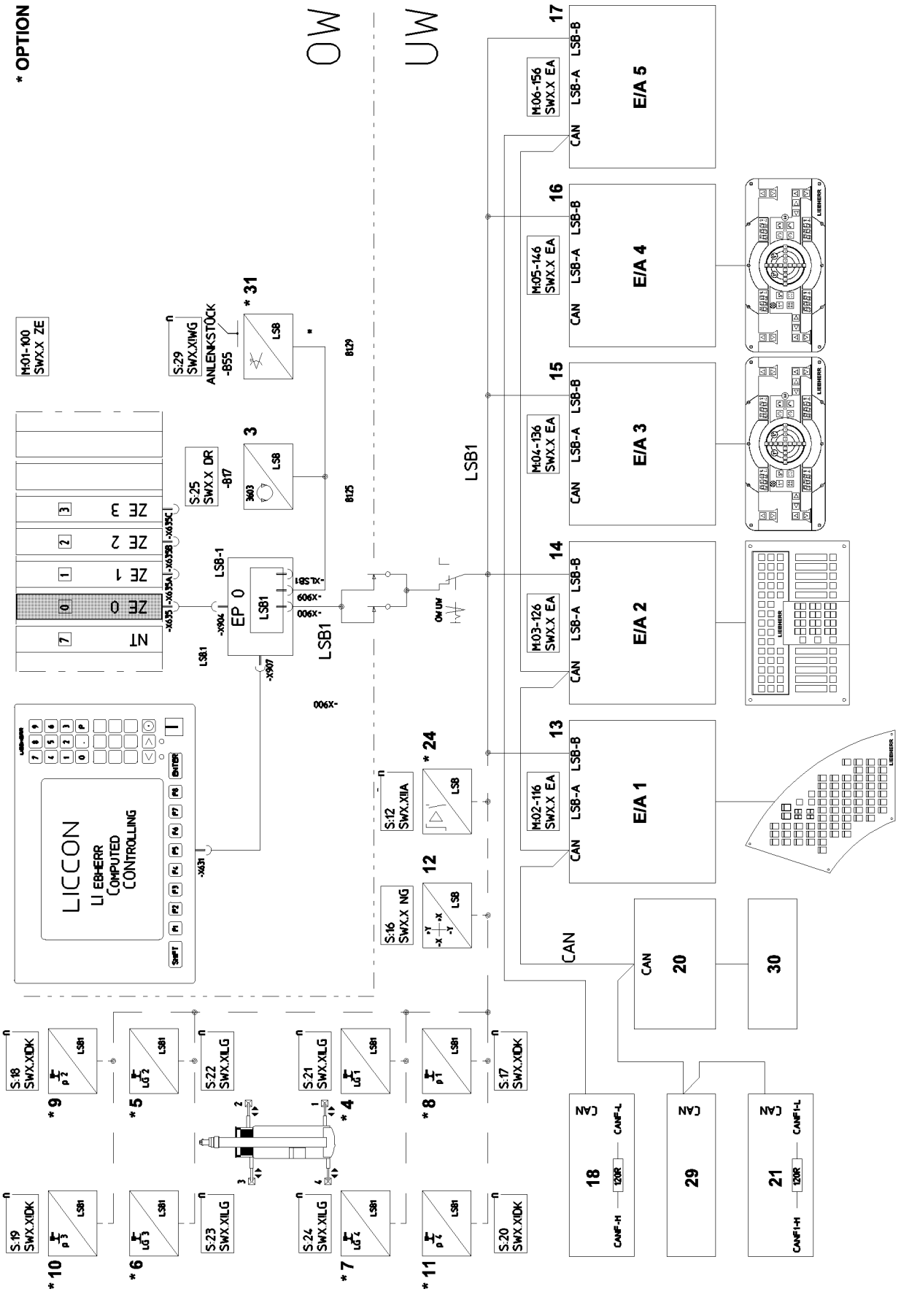
Pos.	Station		Bus address
CPU-3	Central processing unit (CPU) 3 (control cabinet)		1
IPC-B3	Input printed circuit board (IPCB) 3 (control cabinet)		
LSB4	LIEBHERR-System-Bus 4		
1	not assigned		
2	not assigned		
3	Pressure sensor (PS)	Pump 2	21
4	not assigned		
5	not assigned		


* OPTION
OW
UW
LSB1
M:01-100 SWXX ZE
S:29 SWXXIWG ANLENKSTÖCK -855
S:25 SWX.X DR -817
S:12 SWX.XIIA
S:16 SWX.X NG
M:02-116 SWX.X EA
M:03-126 SWX.X EA
M:04-136 SWX.X EA
M:05-146 SWX.X EA
M:06-156 SWX.X EA
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
LSB-A LSB-B
CAN
LSB1
EP 0
ZE 0
ZE 1
ZE 2
ZE 3
NT
LICCON
LI EBHERR
COMPUTED
CONTROLLING
CANF-H
CANF-L
120R
B198067

11 Bus system overview LTM1220-5.1

11.1 LSB1 overview

Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	not assigned		
2	not assigned		
3	Shaft encoder (SE)	Direction of boom	25
4	Length sensor (LS)	Sliding beam 1, rear right	21
5	Length sensor (LS)	Sliding beam 2, front right	22
6	Length sensor (LS)	Sliding beam 3, front left	23
7	Length sensor (LS)	Sliding beam 4, rear left	24
8	Pressure sensor (PS)	Support cylinder, rear right	17
9	Pressure sensor (PS)	Support cylinder, front right	18
10	Pressure sensor (PS)	Support cylinder, front left	19
11	Pressure sensor (PS)	Support cylinder, rear left	20
12	Inclination sensor (IS)		16
13	Input/output module 1 (IO) (center console)	Axle suspension, engine, transmission, control functions, keypad unit	2
14	Input/output module 2 (IO) (center console)	Differential locks, display functions, display unit	3
15	Input/output module 3 (IO) (right support box)	Right support, concentric running, tank, right support control unit	4


* OPTION
OW
UW
LSB1
M:01-100 SWXX ZE
S:29 SWXXIWG ANLENKSTÖCK -855
* 31
S:25 SWX.X DR -817
3
ZE 3
ZE 2
ZE 1
ZE 0
NT
LSB-1
EP 0
LSB1
S:12 SWX.XIIA
* 24
S:16 SWX.X NG
12
M:02-116 SWX.X EA
E/A 1
13
M:03-126 SWX.X EA
E/A 2
14
M:04-136 SWX.X EA
E/A 3
15
M:05-146 SWX.X EA
E/A 4
16
M:06-156 SWX.X EA
E/A 5
17
CAN LSB-A LSB-B
LICCON
LI EBHERR
COMPUTED
CONTROLLING
CAN
20
30
18
29
21
CANF-H
CANF-L
120R
S:18 SWX.XIOK
S:19 SWX.XIOK
S:20 SWX.XIOK
S:17 SWX.XIOK
S:21 SWX.XILG
S:22 SWX.XILG
S:23 SWX.XILG
S:24 SWX.XILG
* 9
* 10
* 5
* 6
* 4
* 7
* 8
* 11

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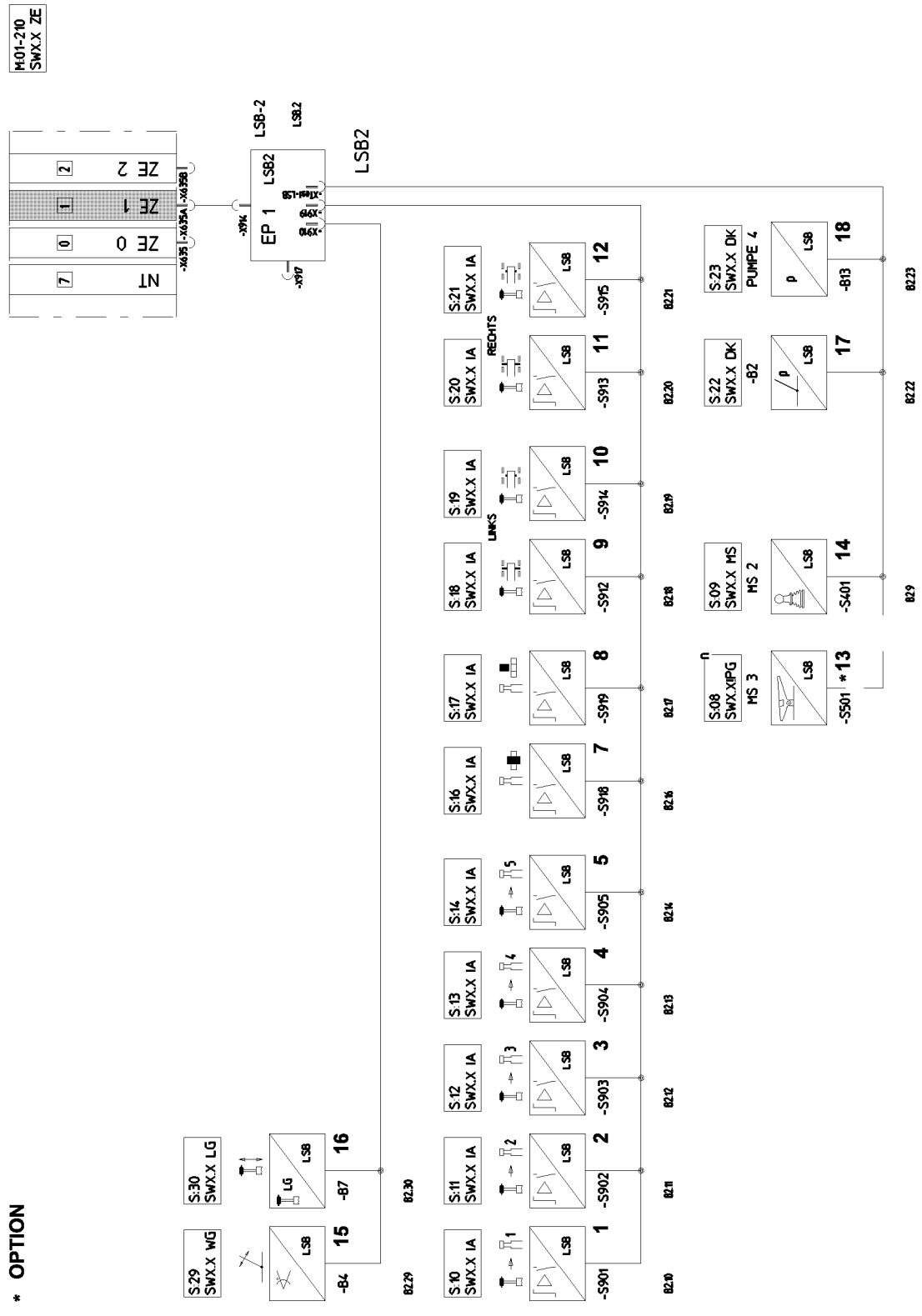
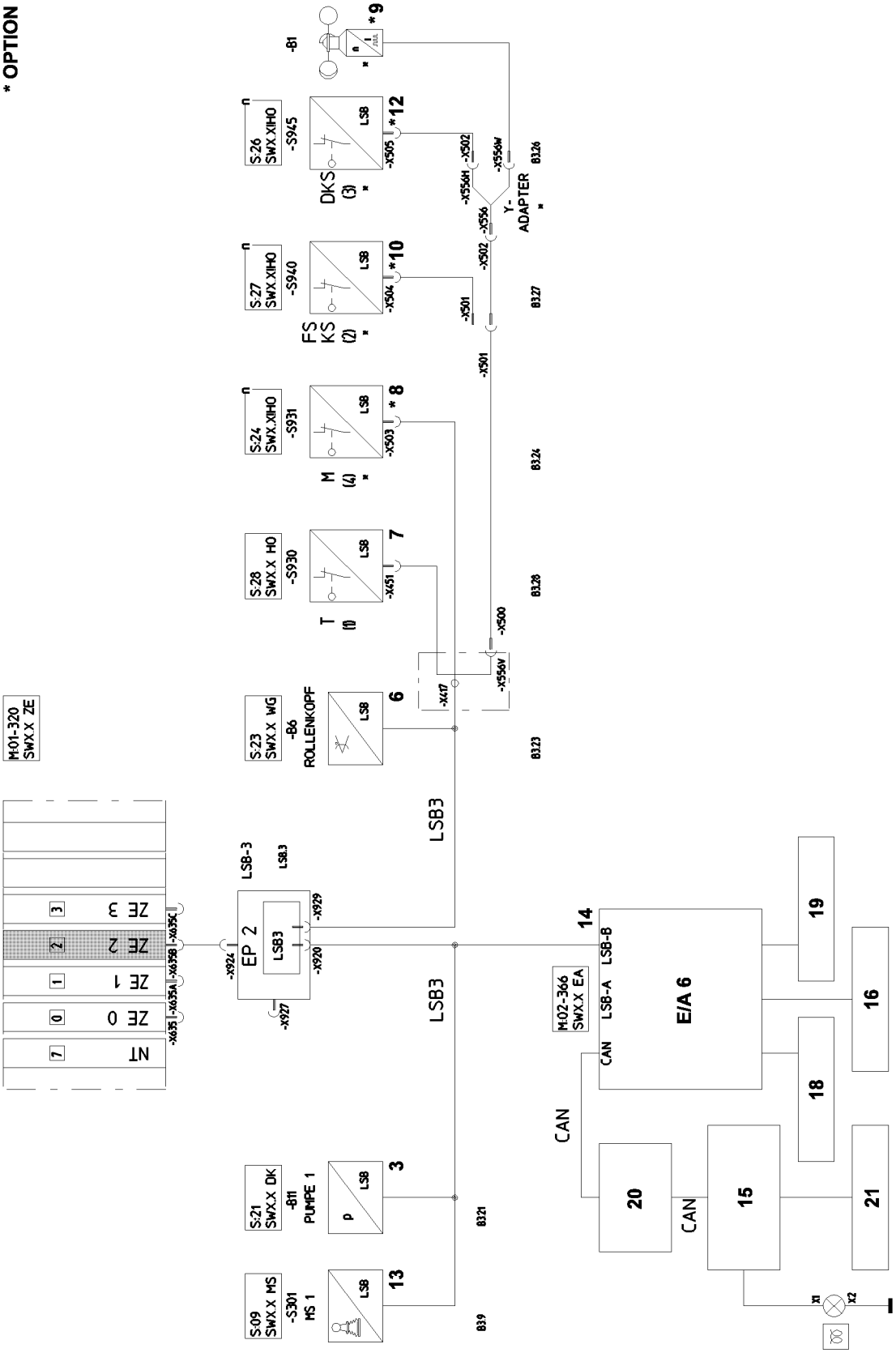
Pos.	Station		Bus address
16	Input/output module 4 (IO) (left support box)	Left support, rear axle steering, left support control unit	5
17	Input/output module 5 (IO) (center console)	Right-hand steering column switch	6
18	Intarder EST-42 (center console)		
19	not assigned		
20	Motor electrical control unit		
21	AS-Tronic transmission		
22	not assigned		
23	not assigned		
24	Inductive sensor (IS)	Ballast monitoring (brake force reduction)	12
25	not assigned		
26	not assigned		
27	not assigned		
28	not assigned		
29	Wheel speed (center console)		
30	Engine flame starting device		
31	Folding jib - articulated piece		


M:01-210
SWX.X ZE
NT
ZE 0
ZE 1
ZE 2
LSB-2
LSB2
EP 1
LSB2
S:29
SWX.X WG
S:30
SWX.X LG
S:10
SWX.X IA
S:11
SWX.X IA
S:12
SWX.X IA
S:13
SWX.X IA
S:14
SWX.X IA
S:16
SWX.X IA
S:17
SWX.X IA
S:18
SWX.X IA
S:19
SWX.X IA
S:20
SWX.X IA
S:21
SWX.X IA
S:08
SWX.XPG
MS 3
S:09
SWX.X MS
MS 2
S:22
SWX.X DK
-B2
S:23
SWX.X DK
PUMPE 4
LINKS
RECHTS
-S901
-S902
-S903
-S904
-S905
-S906
-S907
-S908
-S909
-S910
-S911
-S912
-S913
-S914
-S915
-S401
-S501
-B4
-B7
-B13
* OPTION

B198068

11.2 LSB2 overview

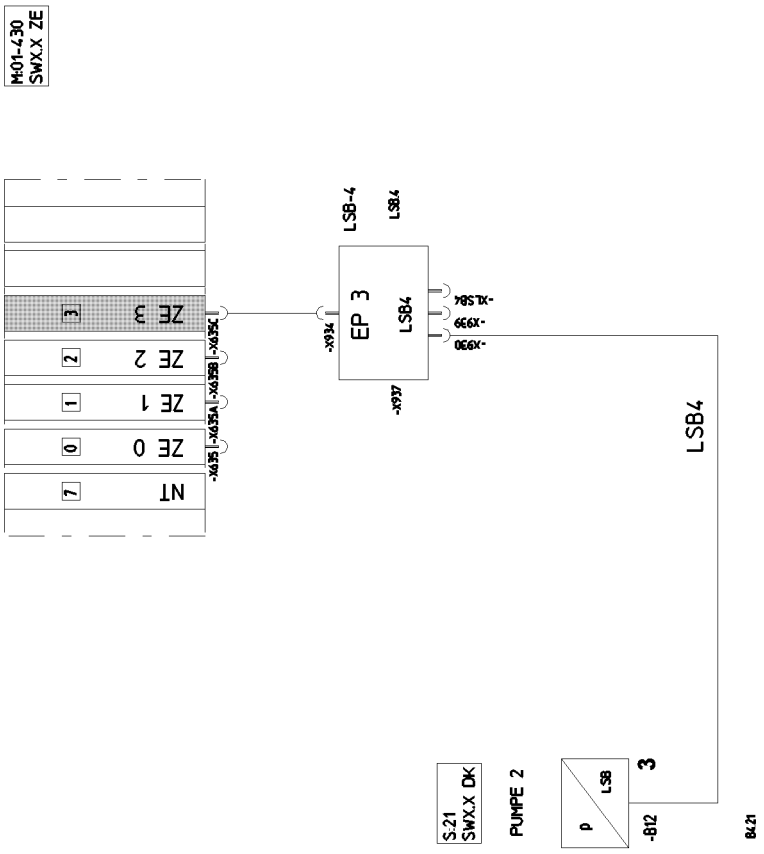
Pos.	Station		Bus address
CPU-1	Central processing unit (CPU) 1 (control cabinet)		1
IPC-B1	Input printed circuit board (IPCB) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
1	Inductive sensor (IS)	Tele pinning 1	10
2	Inductive sensor (IS)	Tele pinning 2	11
3	Inductive sensor (IS)	Tele pinning 3	12
4	Inductive sensor (IS)	Tele pinning 4	13
5	Inductive sensor (IS)	Tele pinning 5	14
6	not assigned		
7	Inductive sensor (IS)	Telescopic boom, pinned	16
8	Inductive sensor (IS)	Telescopic boom, unpinned	17
9	Inductive sensor (IS)	Cylinder pinned, left	18
10	Inductive sensor (IS)	Cylinder unpinned, left	19
11	Inductive sensor (IS)	Cylinder pinned, right	20
12	Inductive sensor (IS)	Cylinder unpinned, right	21
13	Pedal sensor (PS) (MS3)		8
14	Master switch 2 (MS2)		9
15	Angle sensor (AS)	Tele pivot section	29
16	Length sensor (LS)	Telescoping cylinder	30
17	Pressure sensor (PS)	Luffing cylinder, piston surface	22
18	Pressure sensor (PS)	Pump 4 + 5	23
19	not assigned		
20	not assigned		


* OPTION
M:01-320
SWX.X ZE
NT
ZE 0
ZE 1
ZE 2
ZE 3
LSB-3
LSB3
EP 2
LSB3
LSB3
LSB3
S:09
SWX.X MS
-S301
MS 1
S:21
SWX.X DK
-B11
PUMPE 1
S:23
SWX.X WG
-B6
ROLLENKOPF
S:24
SWX.X HO
-S931
S:26
SWX.X HO
-S945
S:27
SWX.X HO
-S940
S:28
SWX.X HO
-S930
M
(4)
FS
KS
(2)
DKS
(3)
T
(1)
-B1
Y-
ADAPTER
M:02-366
SWX.X EA
E/A 6
CAN
CAN
CAN
LSB-A
LSB-B
LSB
B321
B323
B324
B326
B327
B328
B39
X1
X2

B198069

11.3 LSB3 overview

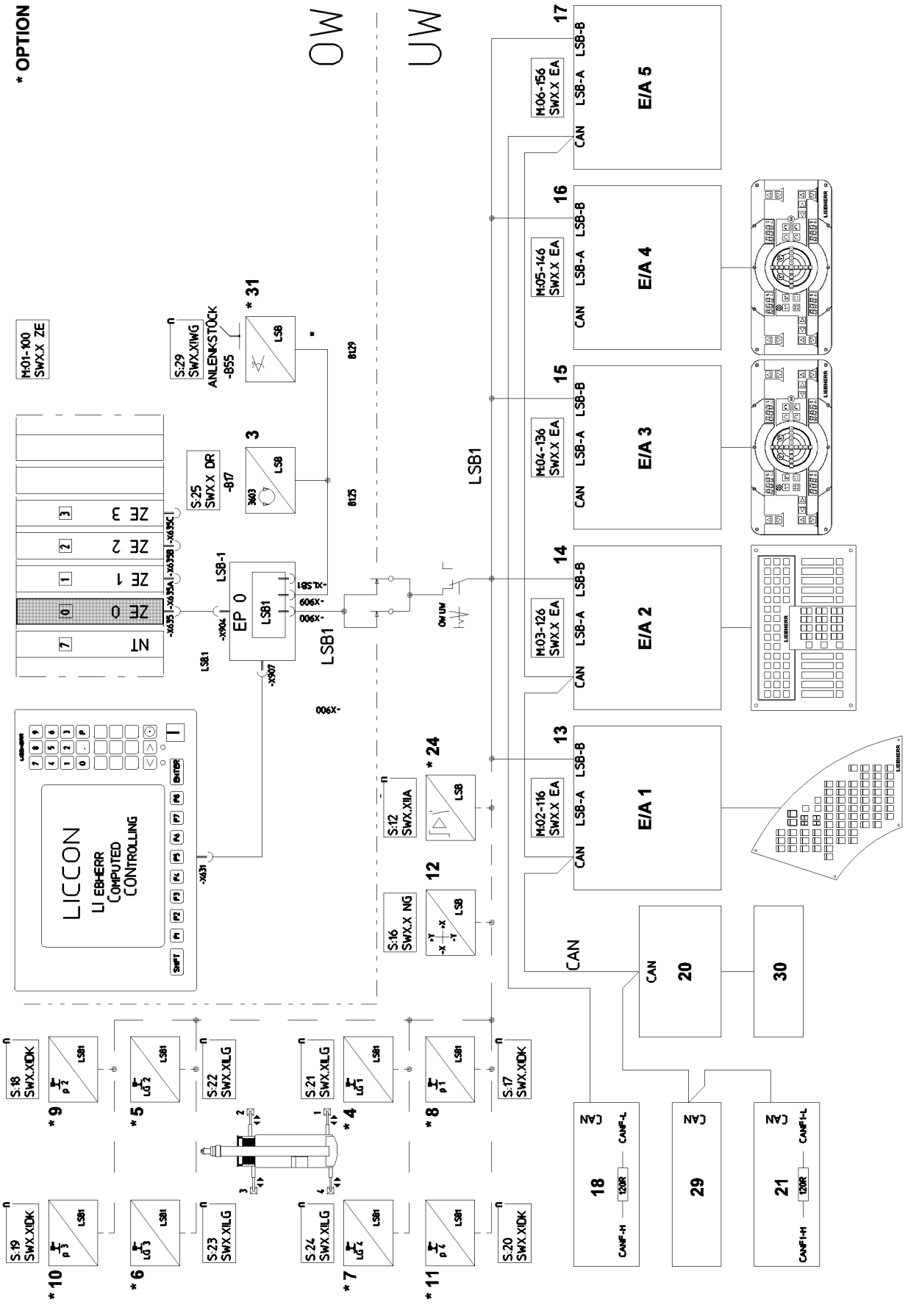
Pos.	Station		Bus address
CPU-2	Central processing unit (CPU) 2 (control cabinet)		1
IPC-B2	Input printed circuit board (IPCB) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
1	not assigned		
2	not assigned		
3	Pressure sensor (PS)	Pump 1	21
4	not assigned		
5	not assigned		
6	Angle sensor (AS)	Pulley head	23
7	Hoist limit switch (HO) 1	Telescopic boom head, right	28
8	Hoist limit switch (HO) 4	Boom nose (2nd HO Tele left)	24
9	Wind sensor		
10	Hoist limit switch (HO) 2	Single folding jib	27
11	not assigned		
12	Hoist limit switch (HO) 3	Dual folding jib	26
13	Master switch 1 (MS1)		9
14	Input/output module 6 (IO)	Cooler drive, exhaust flap retention straps, ventilation flaps	2
15	Motor electrical control unit		
16	Ventilation flap		
17	not assigned		
18	Cooler drive		
19	Exhaust flap retention strap		
20	CAN bus neutral point		
21	Flame starting device		


M:01-430
SW:X.X ZE
ZE 3
ZE 2
ZE 1
ZE 0
NT
LSB-4
LSB4
EP 3
LSB4
-X934
-X937
-X930
-X939
-XLSB4
LSB4
S:21
SW:X.X OK
PUMPE 2
p
LSB
3
-812
8421

B198070

11.4 LSB4 overview

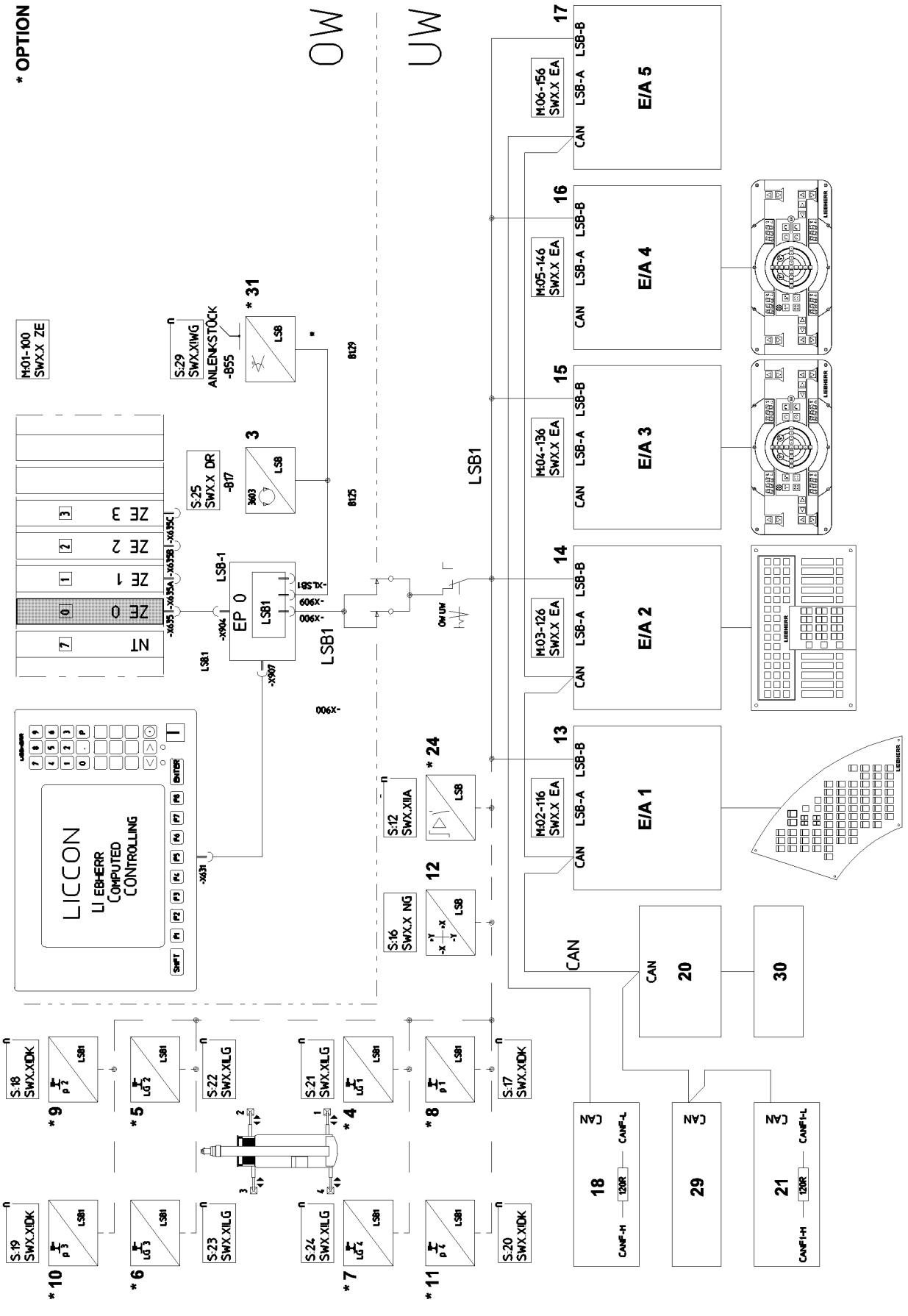
Pos.	Station		Bus address
CPU-3	Central processing unit (CPU) 3 (control cabinet)		1
IPC-B3	Input printed circuit board (IPCB) 3 (control cabinet)		
LSB4	LIEBHERR-System-Bus 4		
1	not assigned		
2	not assigned		
3	Pressure sensor (PS)	Pump 2	21
4	not assigned		
5	not assigned		
6	not assigned		
7	not assigned		
8	not assigned		
9	not assigned		
10	not assigned		


* OPTION
OW
UW
LSB1
M:01-100 SWXX ZE
S:29 SWXXIWG ANLENKSTÖCK -855
S:25 SWX.X DR -817
S:12 SWX.XIIA
S:16 SWX.X NG
M:02-116 SWX.X EA
M:03-126 SWX.X EA
M:04-136 SWX.X EA
M:05-146 SWX.X EA
M:06-156 SWX.X EA
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
LSB-A LSB-B CAN
LICCON
LI EBHERR COMPUTED CONTROLLING
EP 0
LSB1
LSB-1
ZE 0
ZE 1
ZE 2
ZE 3
NT
CAN
20
30
18
29
21
CANF-H
CANF-L
120R
S:17 SWX.XDK
S:18 SWX.XDK
S:19 SWX.XDK
S:20 SWX.XDK
S:21 SWX.XLG
S:22 SWX.XLG
S:23 SWX.XLG
S:24 SWX.XLG
B199969

12 Bus system overview LTM1220-5.2

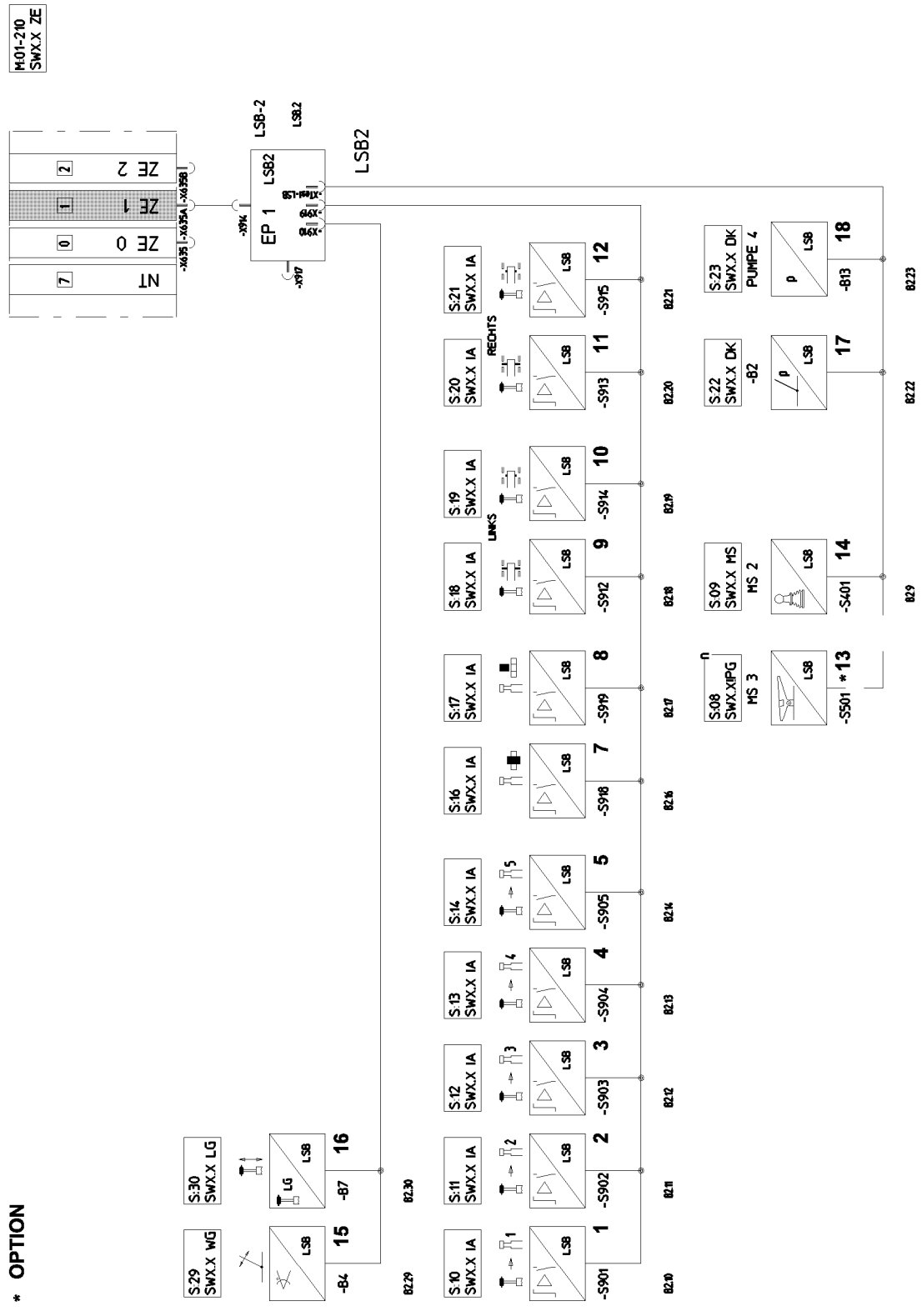
12.1 LSB1 overview

Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	not assigned		
2	not assigned		
3	Shaft encoder (SE)	Direction of boom	25
4	Length sensor (LS)	Sliding beam 1, rear right	21
5	Length sensor (LS)	Sliding beam 2, front right	22
6	Length sensor (LS)	Sliding beam 3, front left	23
7	Length sensor (LS)	Sliding beam 4, rear left	24
8	Pressure sensor (PS)	Support cylinder, rear right	17
9	Pressure sensor (PS)	Support cylinder, front right	18
10	Pressure sensor (PS)	Support cylinder, front left	19
11	Pressure sensor (PS)	Support cylinder, rear left	20
12	Inclination sensor (IS)		16
13	Input/output module 1 (IO) (center console)	Axle suspension, engine, transmission, control functions, keypad unit	2
14	Input/output module 2 (IO) (center console)	Differential locks, display functions, display unit	3
15	Input/output module 3 (IO) (right support box)	Right support, concentric running, tank, right support control unit	4


* OPTION
OW
UW
LSB1
M:01-100 SWXX ZE
S:29 SWXXIWG ANLENKSTÖCK -855
S:25 SWX.X DR -817
S:12 SWX.XIIA
S:16 SWX.X NG
M:02-116 SWX.X EA
M:03-126 SWX.X EA
M:04-136 SWX.X EA
M:05-146 SWX.X EA
M:06-156 SWX.X EA
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
LSB-A LSB-B
CAN
LSB1
EP 0
ZE 0
ZE 1
ZE 2
ZE 3
NT
LICCON
LI EBHERR COMPUTED CONTROLLING
CANH-H
CANH-L
120R
20
29
30
18
21

B199969

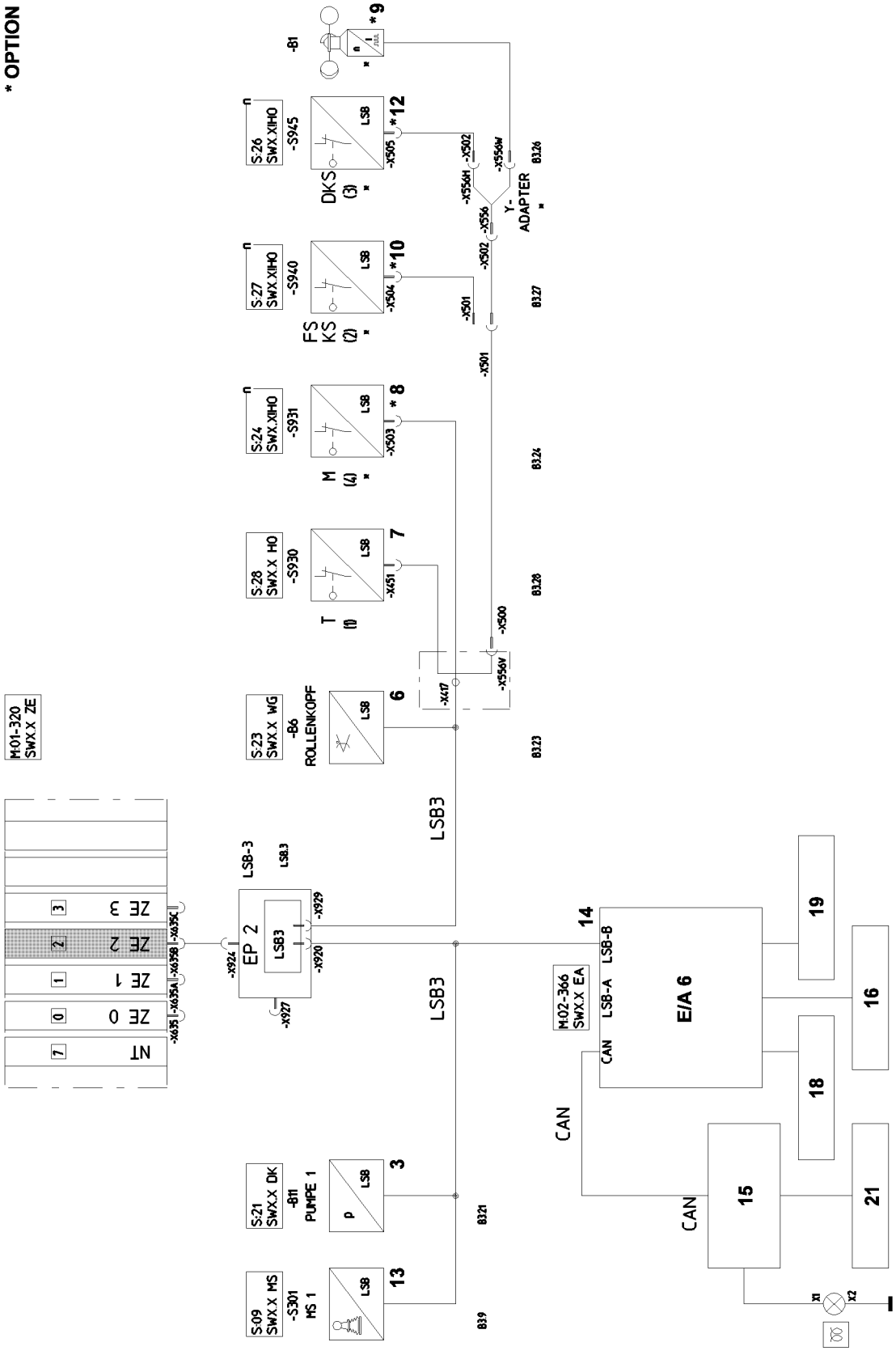
Pos.	Station		Bus address
16	Input/output module 4 (IO) (left support box)	Left support, rear axle steering, left support control unit	5
17	Input/output module 5 (IO) (center console)	Right-hand steering column switch	6
18	Intarder EST-42 (center console)		
19	not assigned		
20	Motor electrical control unit		
21	AS-Tronic transmission		
22	not assigned		
23	not assigned		
24	Inductive sensor (IS)	Ballast monitoring (brake force reduction)	12
25	not assigned		
26	not assigned		
27	not assigned		
28	not assigned		
29	Wheel speed (center console)		
30	Engine flame starting device		
31	Folding jib - articulated piece		


M:01-210
SWX.X ZE
NT
ZE 0
ZE 1
ZE 2
LSB-2
LSB2
EP 1
LSB2
S:29 SWX.X WG
S:30 SWX.X LG
S:10 SWX.X IA
S:11 SWX.X IA
S:12 SWX.X IA
S:13 SWX.X IA
S:14 SWX.X IA
S:16 SWX.X IA
S:17 SWX.X IA
S:18 SWX.X IA
S:19 SWX.X IA
S:20 SWX.X IA
S:21 SWX.X IA
S:08 SWX.XPG MS 3
S:09 SWX.X MS MS 2
S:22 SWX.X DK -B2
S:23 SWX.X DK PUMPE 4
LINKS
RECHTS
-S901
-S902
-S903
-S904
-S905
-S906
-S907
-S908
-S909
-S910
-S911
-S912
-S913
-S914
-S915
-S401
-S501
-B4
-B7
-B13
* OPTION

B199970

12.2 LSB2 overview

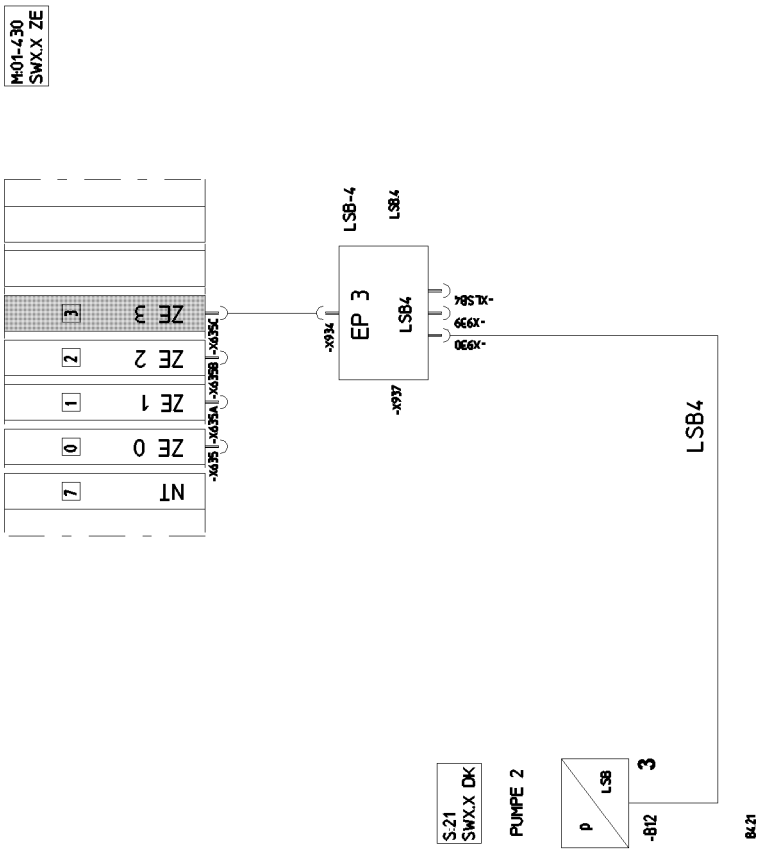
Pos.	Station		Bus address
CPU-1	Central processing unit (CPU) 1 (control cabinet)		1
IPC-B1	Input printed circuit board (IPCB) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
1	Inductive sensor (IS)	Tele pinning 1	10
2	Inductive sensor (IS)	Tele pinning 2	11
3	Inductive sensor (IS)	Tele pinning 3	12
4	Inductive sensor (IS)	Tele pinning 4	13
5	Inductive sensor (IS)	Tele pinning 5	14
6	not assigned		
7	Inductive sensor (IS)	Telescopic boom, pinned	16
8	Inductive sensor (IS)	Telescopic boom, unpinned	17
9	Inductive sensor (IS)	Cylinder pinned, left	18
10	Inductive sensor (IS)	Cylinder unpinned, left	19
11	Inductive sensor (IS)	Cylinder pinned, right	20
12	Inductive sensor (IS)	Cylinder unpinned, right	21
13	Pedal sensor (PS) (MS3)		8
14	Master switch 2 (MS2)		9
15	Angle sensor (AS)	Tele pivot section	29
16	Length sensor (LS)	Telescoping cylinder	30
17	Pressure sensor (PS)	Luffing cylinder, piston surface	22
18	Pressure sensor (PS)	Pump 4 + 5	23
19	not assigned		
20	not assigned		


* OPTION
M:01-320
SWX.X ZE
ZE 3
ZE 2
ZE 1
ZE 0
NT
-X635C
-X635B
-X635A
-X635
LSB-3
LSB.3
EP 2
LSB3
-X924
-X929
-X920
-X927
LSB3
LSB3
-X417
S:23
SWX.X WG
-B6
ROLLENKOPF
6
-X556V
-X500
S:28
SWX.X HO
-S930
T
(1)
7
-X451
S:24
SWX.X8HO
-S931
M
(4)
* 8
-X503
S:27
SWX.X8HO
-S940
FS
KS
(2)
*10
-X504
-X501
-X501
S:26
SWX.X8HO
-S945
DKS
(3)
*12
-X505
-X502
-X5561
-X556
-X502
-X556W
Y-
ADAPTER
-B1
* 9
S:21
SWX.X DK
-B11
PUMPE 1
3
S:09
SWX.X MS
-S301
MS 1
13
M:02-366
SWX.X EA
14
CAN
LSB-A
LSB-B
E/A 6
19
16
18
CAN
15
CAN
21
X1
X2
B326
B327
B324
B328
B323
B321
B39

B199971

12.3 LSB3 overview

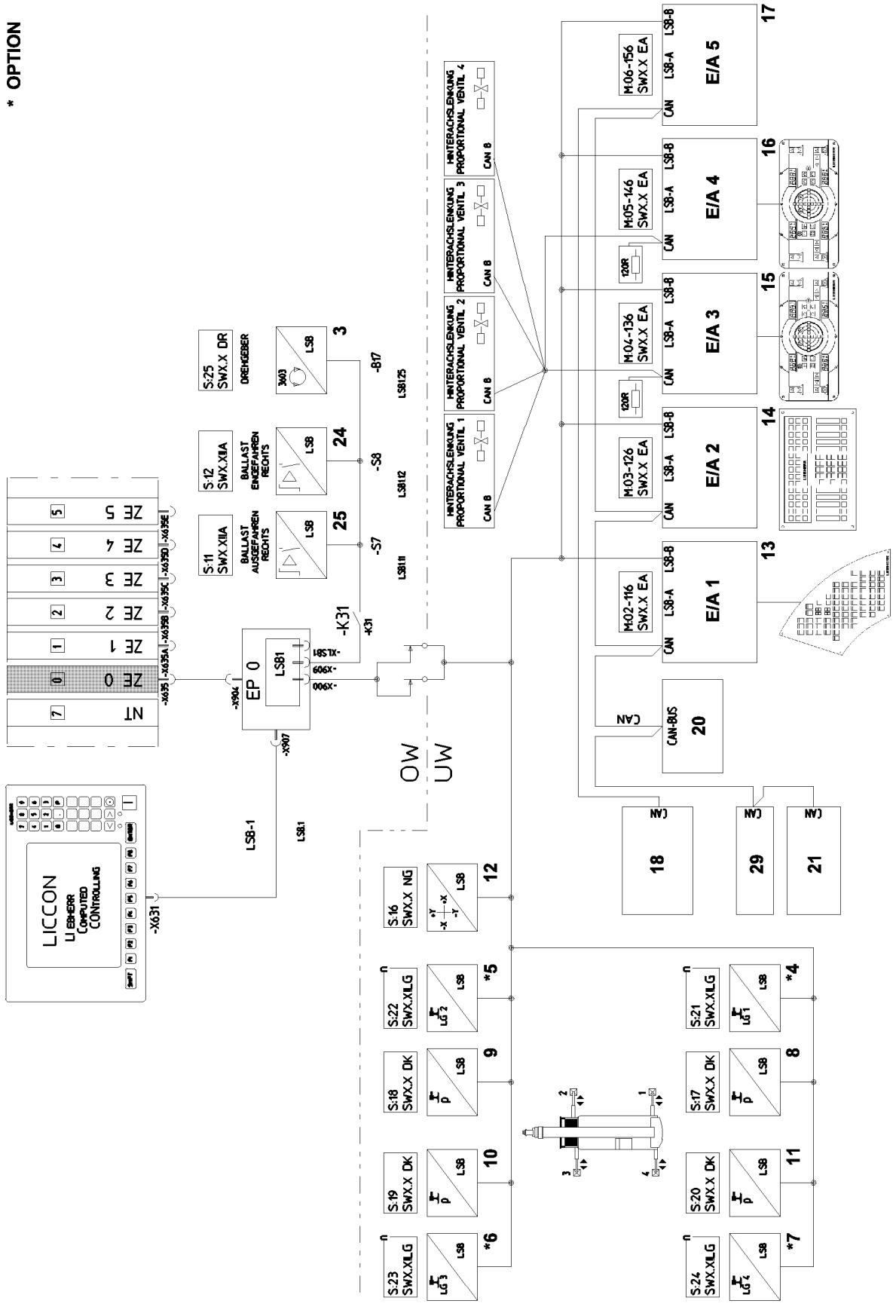
Pos.	Station		Bus address
CPU-2	Central processing unit (CPU) 2 (control cabinet)		1
IPC-B2	Input printed circuit board (IPCB) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
1	not assigned		
2	not assigned		
3	Pressure sensor (PS)	Pump 1	21
4	not assigned		
5	not assigned		
6	Angle sensor (AS)	Pulley head	23
7	Hoist limit switch (HO) 1	Telescopic boom head, right	28
8	Hoist limit switch (HO) 4	Boom nose (2nd HO Tele left)	24
9	Wind sensor		
10	Hoist limit switch (HO) 2	Single folding jib	27
11	not assigned		
12	Hoist limit switch (HO) 3	Dual folding jib	26
13	Master switch 1 (MS1)		9
14	Input/output module 6 (IO)	Cooler drive, exhaust flap retention straps, ventilation flaps	2
15	Motor electrical control unit		
16	Ventilation flap		
17	not assigned		
18	Cooler drive		
19	Exhaust flap retention strap		
20	not assigned		
21	Heat flange		


M:01-430
SW:X.X ZE
ZE 3
ZE 2
ZE 1
ZE 0
NT
LSB-4
LSB4
EP 3
LSB4
-X934
-X937
-X930
-X939
-XLSB4
LSB4
S:21
SW:X.X OK
PUMPE 2
LSB
-B12
3
8.21

B199972

12.4 LSB4 overview

Pos.	Station		Bus address
CPU-3	Central processing unit (CPU) 3 (control cabinet)		1
IPC-B3	Input printed circuit board (IPCB) 3 (control cabinet)		
LSB4	LIEBHERR-System-Bus 4		
1	not assigned		
2	not assigned		
3	Pressure sensor (PS)	Pump 2	21
4	not assigned		
5	not assigned		
6	not assigned		
7	not assigned		
8	not assigned		
9	not assigned		
10	not assigned		

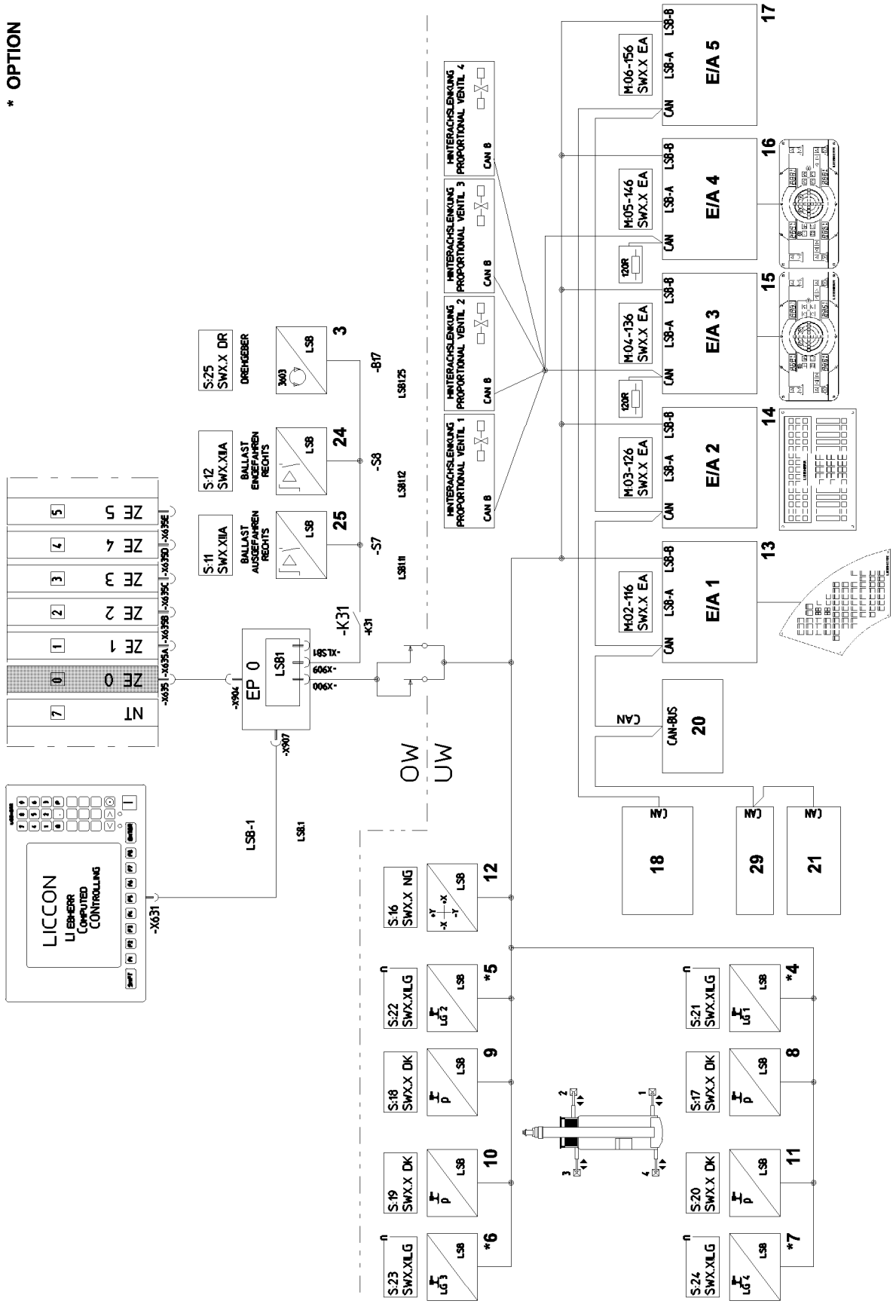

* OPTION
LICCON
LIEBHERR COMPUTED CONTROLLING
-X631
LSB-1
LSB1
EP 0
LSB1
-X904
-X907
-X900
-X609
-X581
-K31
+31
OW
UW
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
NT
-X635
-X635A
-X635B
-X635C
-X635D
-X635E
S:25 SWX.X DR
DREHGEBER
S:12 SWX.X8A
BALLAST EINGEFAHREN RECHTS
S:11 SWX.X8A
BALLAST AUSGEFAHREN RECHTS
3603
LSB
3
24
25
-B17
-S8
-S7
LSB125
LSB112
LSB111
HINTERACHSLENKUNG PROPORTIONAL VENTIL 1
HINTERACHSLENKUNG PROPORTIONAL VENTIL 2
HINTERACHSLENKUNG PROPORTIONAL VENTIL 3
HINTERACHSLENKUNG PROPORTIONAL VENTIL 4
CAN B
M:02-116 SWX.X EA
M:03-126 SWX.X EA
M:04-136 SWX.X EA
M:05-146 SWX.X EA
M:06-156 SWX.X EA
CAN LSB-A LSB-B
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
13
14
15
16
17
120R
CAN-BUS
20
CAN
18
29
21
S:16 SWX.X NG
12
S:22 SWX.XLG
*5
S:18 SWX.X DK
9
S:19 SWX.X DK
10
S:23 SWX.XLG
*6
S:21 SWX.XLG
*4
S:17 SWX.X DK
8
S:20 SWX.X DK
11
S:24 SWX.XLG
*7
n
LSB
LG1
LG2
LG3
LG4
p
x
y
1
2
3
4

B198579

13 Bus system overview LTM1400-7.1

13.1 LSB1 overview

Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	not assigned		
2	not assigned		
3	Shaft encoder (SE)	Boom direction	25
4	Length sensor (LS)	Sliding beam 1, right rear	21
5	Length sensor (LS)	Sliding beam 2, front right	22
6	Length sensor (LS)	Sliding beam 3, front left	23
7	Length sensor (LS)	Sliding beam 4, left rear	24
8	Pressure sensor (PS)	Support cylinder, right rear	17
9	Pressure sensor (PS)	Support cylinder, right front	18
10	Pressure sensor (PS)	Support cylinder, left front	19
11	Pressure sensor (PS)	Support cylinder, left rear	20
12	Inclination sensor (IS)		16
13	Input/output module 1 (IO) (center console)	Axle suspension, engine, transmission, control functions, keypad unit	2
14	Input/output module 2 (IO) (center console)	Differential locks, display functions, display unit	3
15	Input/output module 3 (IO) (right support box)	Right support, concentric running, tank, right support control unit	4


* OPTION
LICCON
LIEBHERR COMPUTED CONTROLLING
-X631
LSB-1
LSB1
EP 0
LSB1
-X904
-X907
-X900
-X909
-XLSB1
-K31
+31
OW
UW
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
NT
-X635
-X635A
-X635B
-X635C
-X635D
-X635E
S:25 SWX.X DR
DREHGEBER
S:12 SWX.X8A
BALLAST EINGEFAHREN RECHTS
S:11 SWX.X8A
BALLAST AUSGEFAHREN RECHTS
3603
LSB
-B17
LSB125
-S8
LSB112
-S7
LSB111
HINTERACHSLENKUNG PROPORTIONAL VENTIL 1
HINTERACHSLENKUNG PROPORTIONAL VENTIL 2
HINTERACHSLENKUNG PROPORTIONAL VENTIL 3
HINTERACHSLENKUNG PROPORTIONAL VENTIL 4
CAN B
M:02-116 SWX.X EA
M:03-126 SWX.X EA
M:04-136 SWX.X EA
M:05-146 SWX.X EA
M:06-156 SWX.X EA
120R
CAN LSB-A LSB-B
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
CAN-BUS
S:16 SWX.X NG
S:18 SWX.X DK
S:19 SWX.X DK
S:22 SWX.XLG
S:23 SWX.XLG
S:17 SWX.X DK
S:20 SWX.X DK
S:21 SWX.XLG
S:24 SWX.XLG
LSB
LG1
LG2
LG3
LG4
p
n
1
2
3
4
8
9
10
11
12
13
14
15
16
17
18
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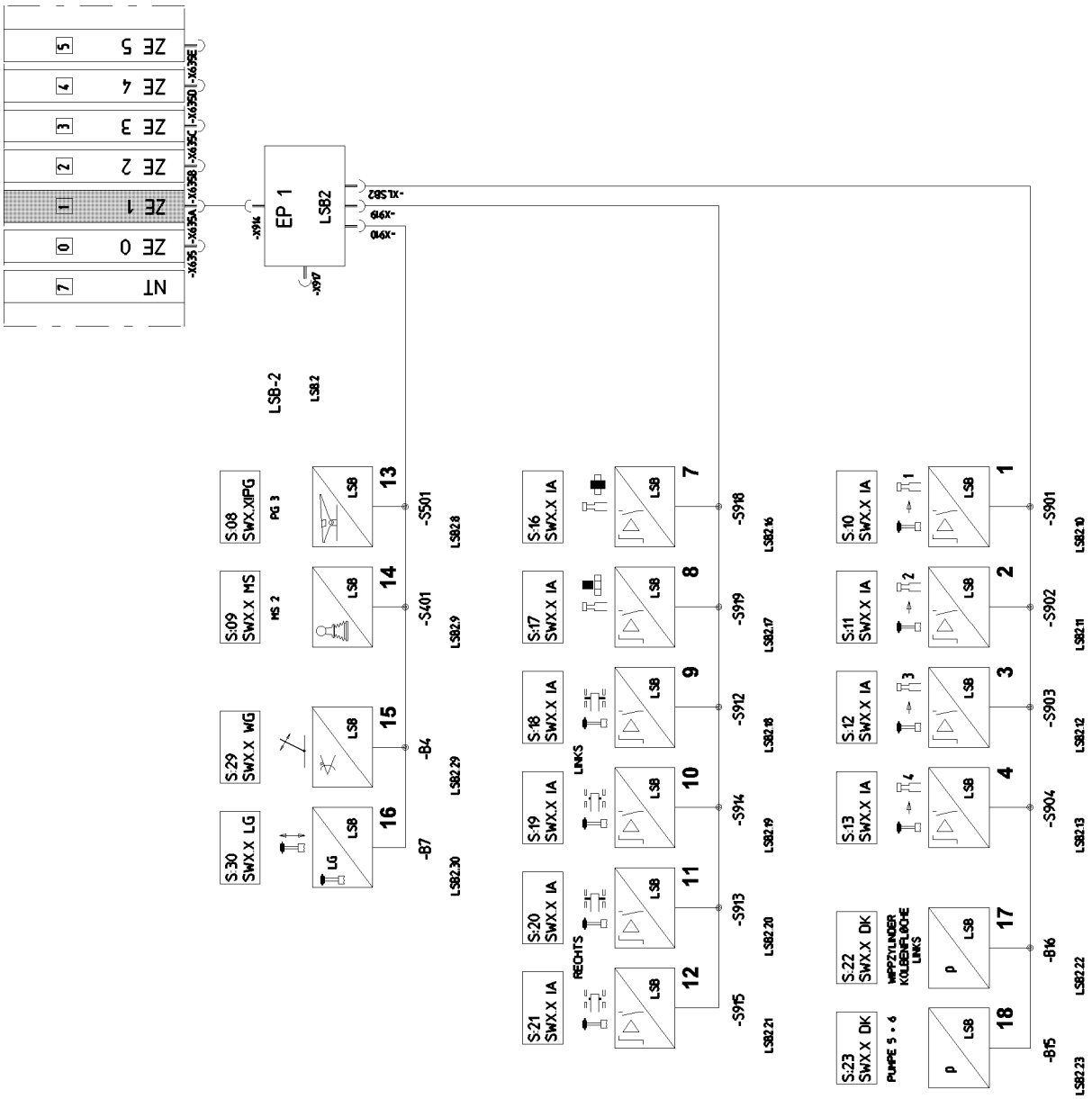
21
29
*4
*5
*6
*7

B198579

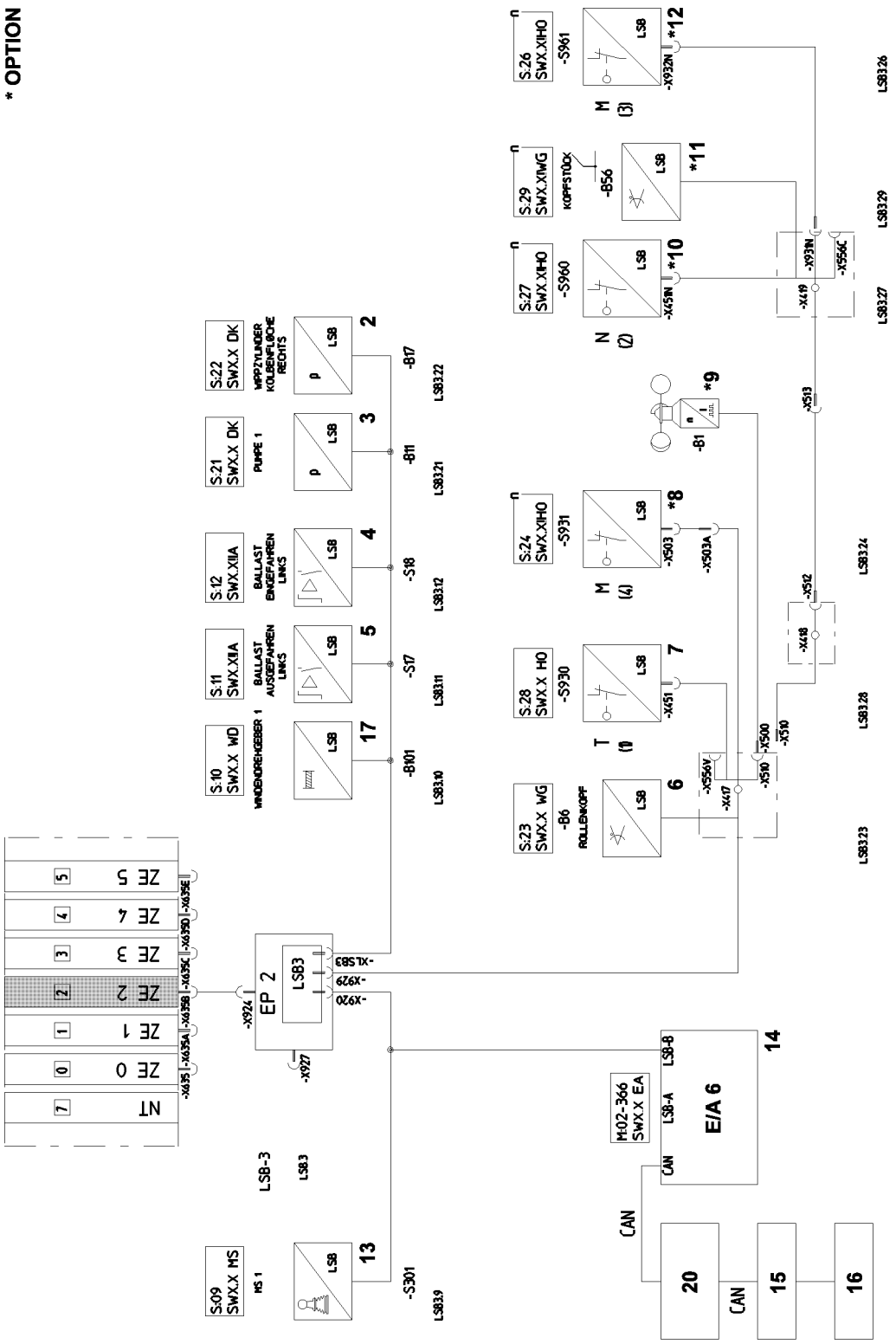
Pos.	Station		Bus address
16	Input/output module 4 (IO) (left support box)	Left support, left support control unit	5
17	Input/output module 5 (IO) (center console)	Right-hand steering column switch	6
18	Instrumentation module (center console)		
19	not assigned		
20	ECU-LMB motor (center console)		
21	TC-Tronic transmission		
22	not assigned		
23	not assigned		
24	Inductive sensor (IS)	Ballast right retracted	12
25	Inductive sensor (IS)	Ballast left retracted	11
26	not assigned		
27	not assigned		
28	not assigned		
29	Wheel speed (center console)		
30	not assigned		
31	not assigned		


ZE 5
ZE 4
ZE 3
ZE 2
ZE 1
ZE 0
NT
EP 1
LSB2
LSB-2
S:08 SWX.XIPG
S:09 SWX.X MS
S:29 SWX.X WG
S:30 SWX.X LG
S:16 SWX.X IA
S:17 SWX.X IA
S:18 SWX.X IA
S:19 SWX.X IA
S:20 SWX.X IA
S:21 SWX.X IA
S:10 SWX.X IA
S:11 SWX.X IA
S:12 SWX.X IA
S:13 SWX.X IA
S:22 SWX.X DK
S:23 SWX.X DK
RECHTS
LINKS
LG
LSB

B198580

13.2 LSB2 overview

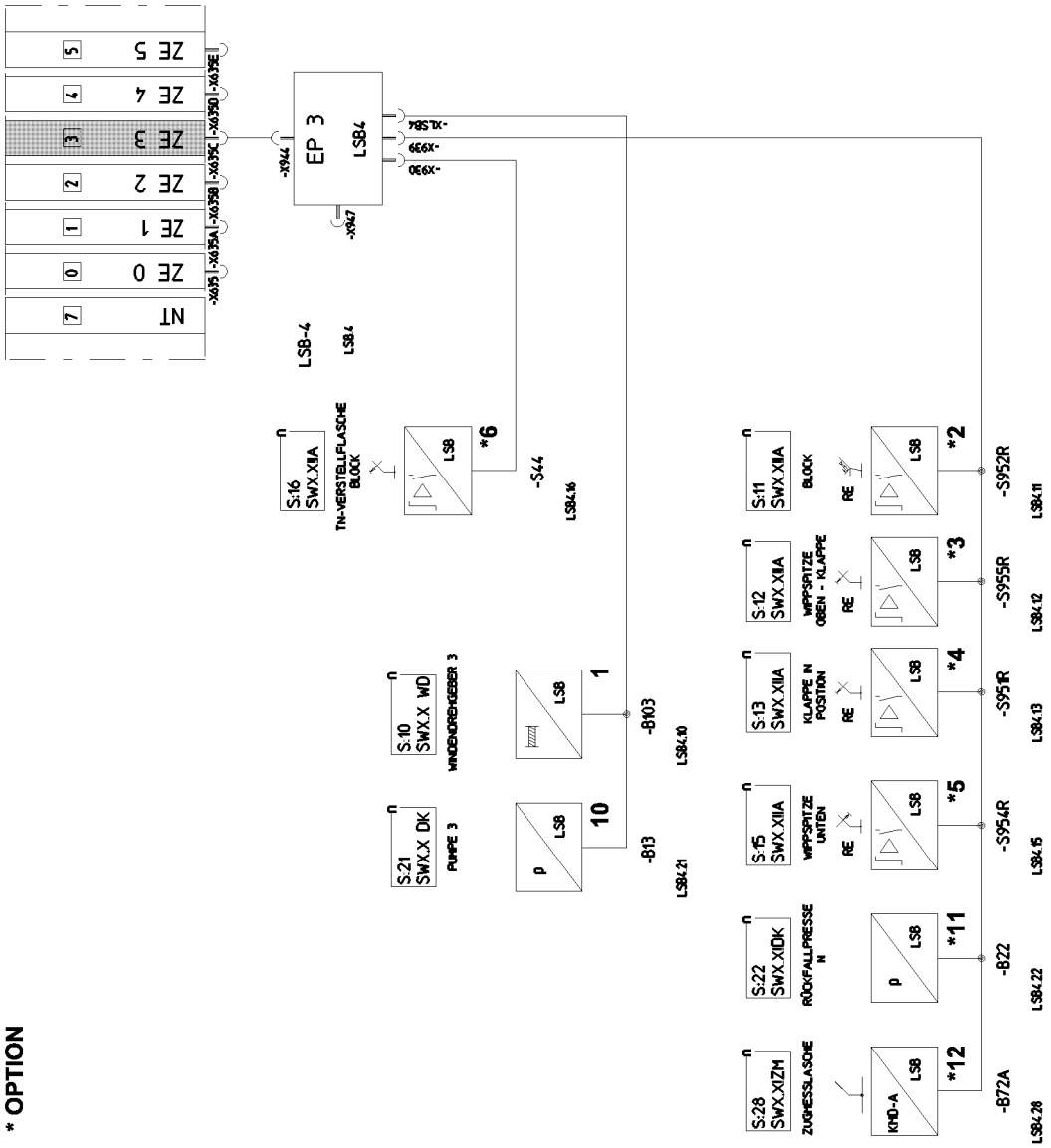
Pos.	Station		Bus address
CPU-1	Central processing unit (CPU) 1 (control cabinet)		1
IPC-B1	Input printed circuit board (IPCB) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
1	Inductive sensor (IS)	Tele pinning 1	10
2	Inductive sensor (IS)	Tele pinning 2	11
3	Inductive sensor (IS)	Tele pinning 3	12
4	Inductive sensor (IS)	Tele pinning 4	13
5	not assigned		
6	not assigned		
7	Inductive sensor (IS)	Telescopic boom, pinned	16
8	Inductive sensor (IS)	Telescopic boom, unpinned	17
9	Inductive sensor (IS)	Cylinder pinned, left	18
10	Inductive sensor (IS)	Cylinder unpinned, left	19
11	Inductive sensor (IS)	Cylinder pinned, right	20
12	Inductive sensor (IS)	Cylinder unpinned, right	21
13	Pedal sensor (PS3)		8
14	Master switch 2 (MS2)		9
15	Angle sensor (AS)	Tele pivot section	29
16	Length sensor (LS)	Telescoping cylinder	30
17	Pressure sensor (PS)	Luffing cylinder, piston surface left	22
18	Pressure sensor (PS)	Pump 5+ 6	23
19	not assigned		
20	not assigned		


* OPTION
S:09 SWX.X MS
MS 1
S:10 SWX.X WD
WINDENDREHGEBER 1
S:11 SWX.X11A
BALLAST AUSGEFAHREN LINKS
S:12 SWX.X11A
BALLAST EINGEFAHREN LINKS
S:21 SWX.X DK
PUMPE 1
S:22 SWX.X DK
HUBZYLINDER KOLBENFLÄCHE RECHTS
S:23 SWX.X WG
-B6
ROLLENKOPF
S:24 SWX.X11HO
-S931
S:26 SWX.X11HO
-S961
S:27 SWX.X11HO
-S960
S:28 SWX.X HO
-S930
S:29 SWX.X11WG
-B56
KOPFSTOCK
M02-366 SWX.X EA
E/A 6
EP 2
LSB3
LSB-3
LSB-A
LSB-B
CAN
-X924
-X927
-X9Z0
-X9Z6
-XLSB3
-X635
-X635A
-X635B
-X635C
-X635D
-X635E
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
NT
-S301
-B101
-S17
-S18
-B11
-B17
-X417
-X418
-X419
-X500
-X503
-X503A
-X510
-X513
-X532
-X556V
-X556C
-X932N
-X933N
-X451
-X458N
-B1
LSB326
LSB329
LSB327
LSB324
LSB328
LSB323
LSB322
LSB321
LSB312
LSB311
LSB310
LSB339
LSB3
M (3)
M (4)
N (2)
T (1)
*8
*9
*10
*11
*12
2
3
4
5
6
7
13
14
15
16
17
20

B198581

13.3 LSB3 overview

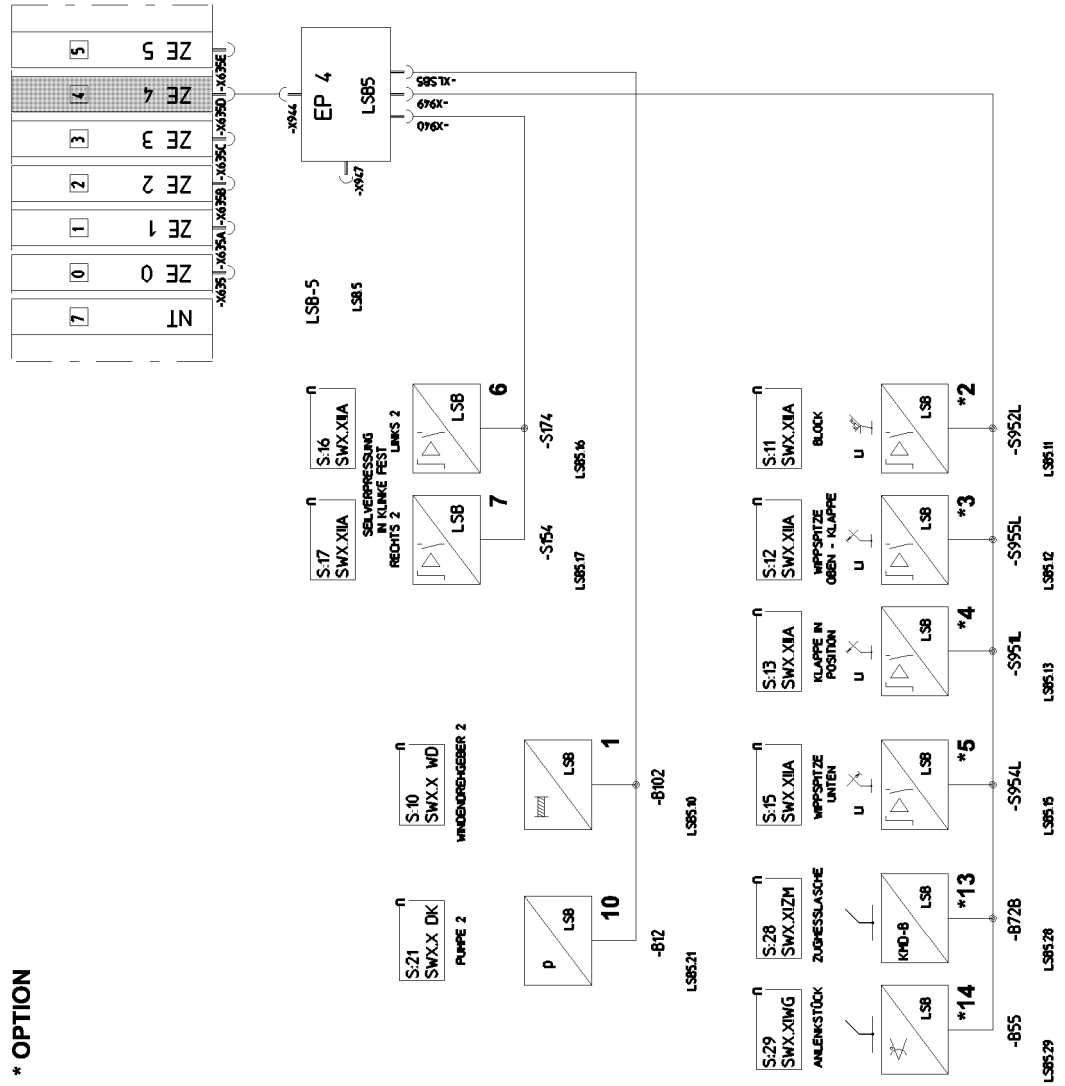
Pos.	Station		Bus address
CPU-2	Central processing unit (CPU) 2 (control cabinet)		1
IPC-B2	Input printed circuit board (IPCB) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
1	not assigned		
2	Pressure sensor (PS)	Luffing cylinder, piston surface right	22
3	Pressure sensor (PS)	Pump 1	21
4	Inductive sensor (IS)	Counterweight left retracted	12
5	Inductive sensor (IS)	Counterweight left extended	11
6	Angle sensor (AS)	Pulley head	23
7	Hoist limit switch (HO) 1	Telescopic boom head, right	28
8	Hoist limit switch (HO) 4	Boom nose (second HO Tele left)	24
9	Wind sensor		
10	Hoist limit switch (HO) 2	Luffing jib/needle boom	27
11	Angle sensor (AS)	Head piece	29
12	Hoist limit switch (HO) 3	Boom nose (accessory)	26
13	Master switch (MS1)		9
14	Input/output module 6 (IO)		2
15	ECU (motor)		
16	Heat flange		
17	Wind sensor (WS) 1		10
18	not assigned		
19	not assigned		
20	Can-bus star point		
21	not assigned		


NT
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
EP 3
LSB4
LSB-4
S:16 SWX.XIIA
TN-VERSTELLFLASCHE BLOCK
S:10 SWX.X WD
WINDGEBERGEBER 3
S:21 SWX.X DK
PUMPE 3
S:28 SWX.XIZH
ZUGPRESSLASCHE
S:22 SWX.XIDK
RÜCKFALLPRESSE N
S:15 SWX.XIIA
WIPPSPITZE UNTEN
S:13 SWX.XIIA
KLAPPE IN POSITION
S:12 SWX.XIIA
WIPPSPITZE OBEN - KLAPPE
S:11 SWX.XIIA
BLOCK
-S44
-B103
-B13
-B22
-B72A
-S952R
-S955R
-S95IR
-S954R
LSB
*1
*2
*3
*4
*5
*6
*11
*12
KHD-A
RE
* OPTION

B198582

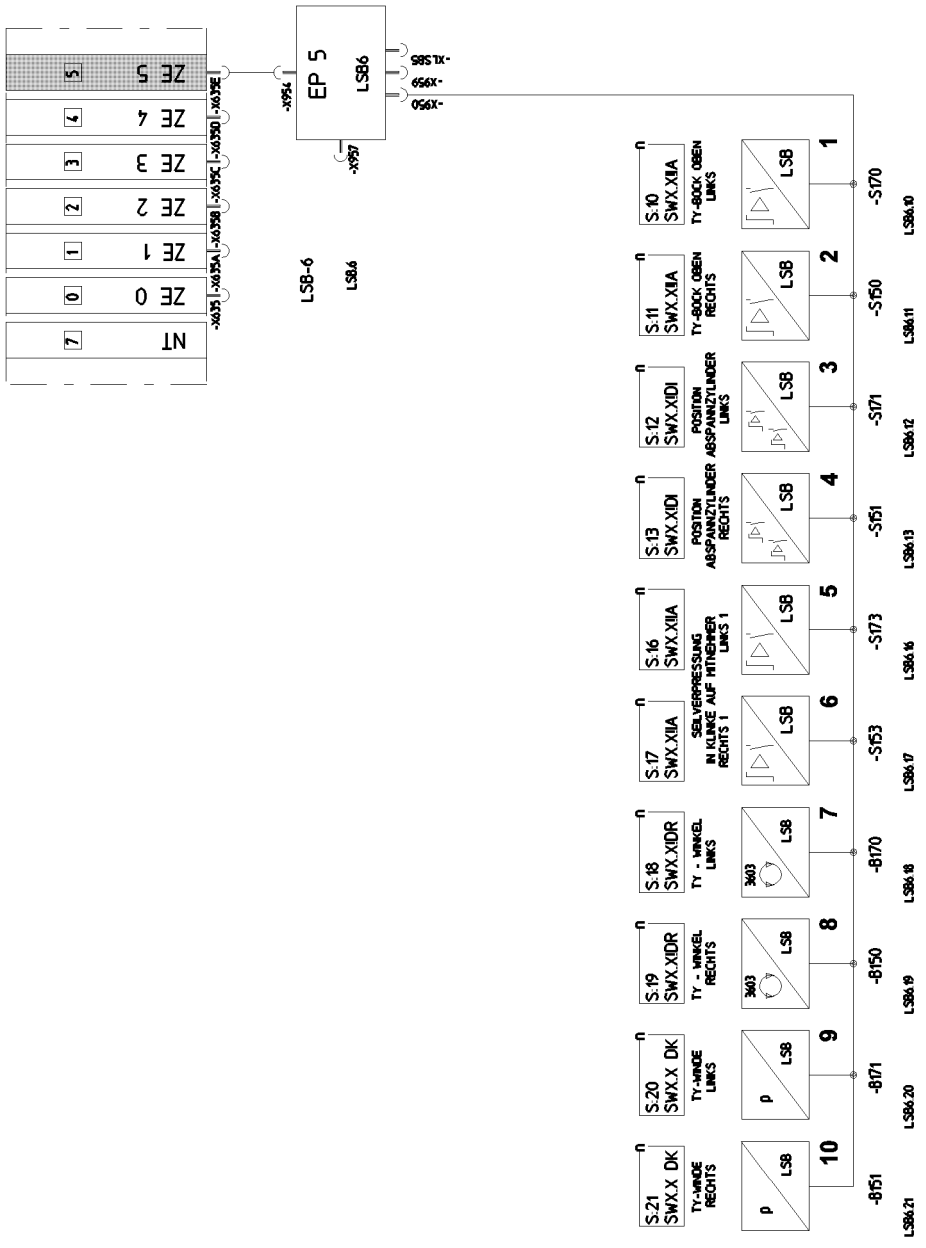
13.4 LSB4 overview

Pos.	Station		Bus address
CPU-3	Central processing unit (CPU) 3 (control cabinet)		1
IPC-B3	Input printed circuit board (IPCB) 3 (control cabinet)		
LSB4	LIEBHERR-System-Bus 4		
1	Wind sensor (WS) 3		10
2	Inductive sensor (IS)	Block	11
3	Inductive sensor (IS)	Luffing jib top - flap right	12
4	Inductive sensor (IS)	Flap in position, right	13
5	Inductive sensor (IS)	Luffing jib bottom right	15
6	Inductive sensor (IS)	TN adjusting cylinder block, right	16
7	not assigned		
8	not assigned		
9	not assigned		
10	Pressure sensor (PS)	Pump 3	21
11	Pressure sensor (PS)	Release press N	22
12	Strain gauge link (SG)		28


* OPTION
B198583

13.5 LSB5 overview

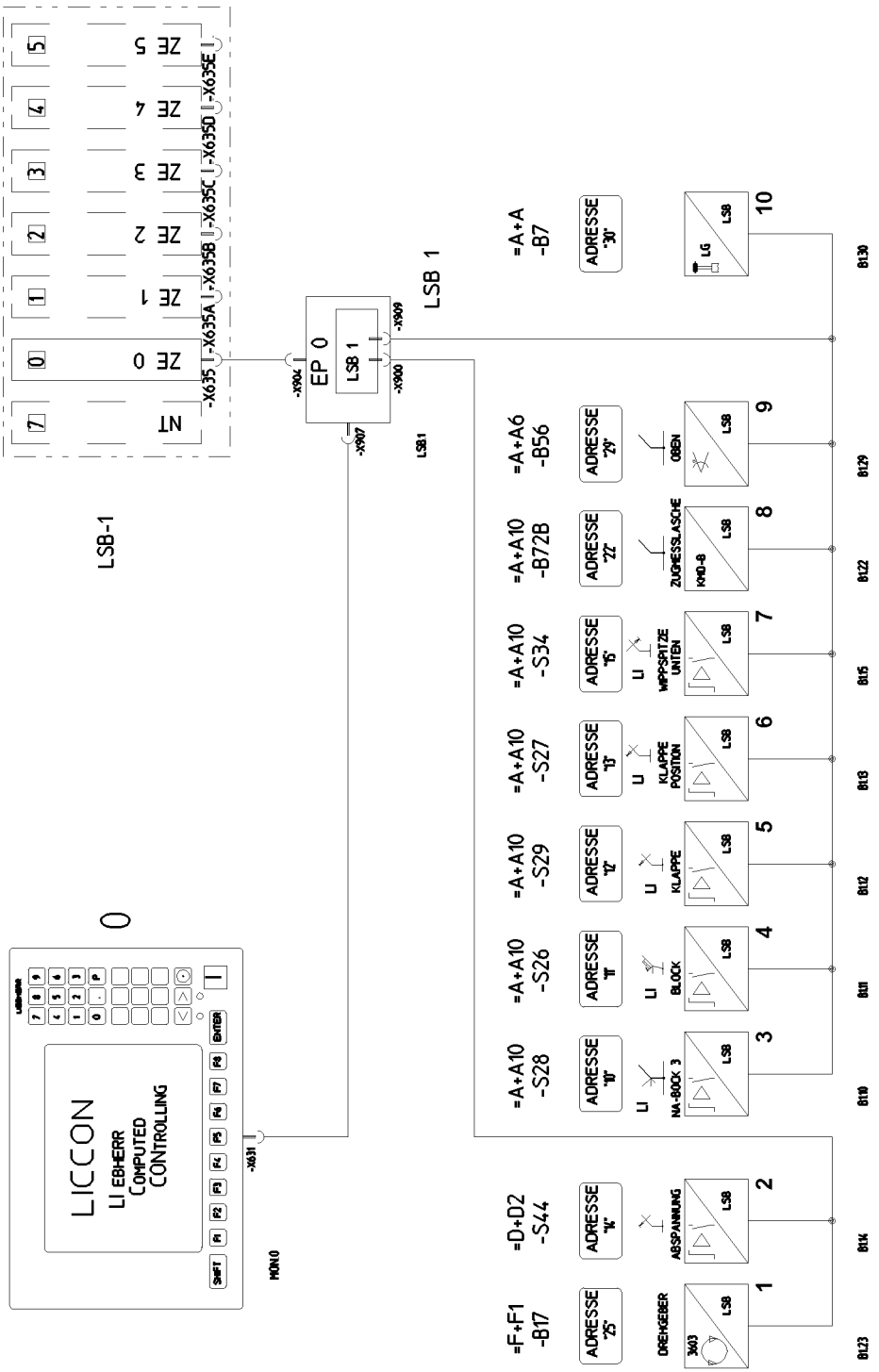
Pos.	Station		Bus address
CPU-4	Central processing unit (CPU) 4 (control cabinet)		1
IPC-B4	Input printed circuit board (IPCB) 4 (control cabinet)		
LSB5	LIEBHERR-System-Bus 5		
1	Wind sensor (WS) 2		10
2	Inductive sensor (IS)	Block left	11
3	Inductive sensor (IS)	Luffing jib top - flap right	12
4	Inductive sensor (IS)	Flap in position, left	13
5	Inductive sensor (IS)	Luffing jib bottom left	15
6	Inductive sensor (IS)	Cable pressing fixed in latch, left 2	16
7	Inductive sensor (IS)	Cable pressing fixed in latch, right 2	17
8	not assigned		
9	not assigned		
10	Pressure sensor (PS)	Pump 2	21
11	not assigned		
12	not assigned		
13	Strain gauge link (SG)		28
14	Angle sensor (AS)	Articulated piece	29


EP 5
LSB6
-X954
-X957
-X959
-X960
-X585
LSB-6
LSB6
ZE 5
ZE 4
ZE 3
ZE 2
ZE 1
ZE 0
NT
-X635
-X635A
-X635B
-X635C
-X635D
-X635E
S.10 SWX.X8A TY-BOCK OBEN LINKS -S170 LSB6.10
S.11 SWX.X8A TY-BOCK OBEN RECHTS -S150 LSB6.11
S.12 SWX.X8DI POSITION ABSPANNZYLINDER LINKS -S171 LSB6.12
S.13 SWX.X8DI POSITION ABSPANNZYLINDER RECHTS -S151 LSB6.13
S.16 SWX.X8A SELVERPRESSUNG IN KLINKE AUF MITNEHMER LINKS 1 -S173 LSB6.16
S.17 SWX.X8A SELVERPRESSUNG IN KLINKE AUF MITNEHMER RECHTS 1 -S153 LSB6.17
S.18 SWX.X8DR TY - WINKEL LINKS -B170 LSB6.18
S.19 SWX.X8DR TY - WINKEL RECHTS -B150 LSB6.19
S.20 SWX.X DK TY-MODE LINKS -B171 LSB6.20
S.21 SWX.X DK TY-MODE RECHTS -B151 LSB6.21
LSB
360
ρ

B198584

13.6 LSB6 overview

Pos.	Station		Bus address
CPU-5	Central processing unit (CPU) 5 (control cabinet)		1
IPC-B5	Input printed circuit board (IPCB) 5 (control cabinet)		
LSB6	LIEBHERR-System-Bus 6		
1	Inductive sensor (IS)	TY-frame top left	10
2	Inductive sensor (IS)	TY-frame top right	11
3	Dual inductive sensor (DI)	Position tension cylinder, left	12
4	Dual inductive sensor (DI)	Position tension cylinder, right	13
5	Inductive sensor (IS)	Cable pressing in latch on driver, left 1	16
6	Inductive sensor (IS)	Cable pressing in latch on driver, right 1	17
7	Shaft encoder (SE)	TY-angle left	18
8	Shaft encoder (SE)	TY-angle right	19
9	Pressure sensor (PS)	TY-winch left	20
10	Pressure sensor (PS)	TY-winch right	21

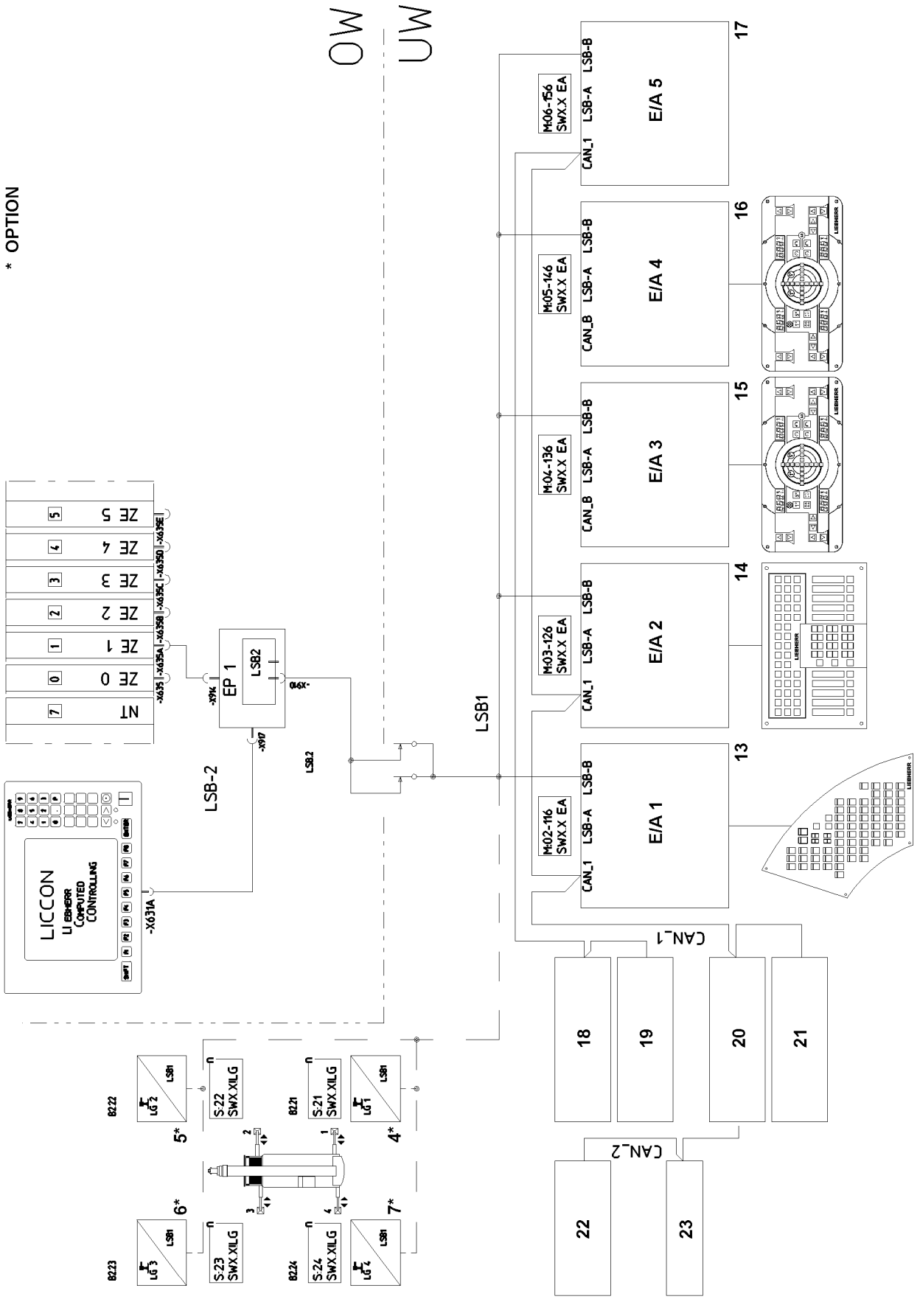

LSB-1
LSB 1
EP 0
LSB 1
LICCON
LI EBHERR
COMPUTED
CONTROLLING
MON10
ADRESSE "25"
ADRESSE "1"
ADRESSE "11"
ADRESSE "12"
ADRESSE "13"
ADRESSE "15"
ADRESSE "22"
ADRESSE "29"
ADRESSE "30"
DREHGEBER
ABSPANNUNG
BLOCK
KLAPPE
KLAPPE POSITION
WIPPSPITZE UNTEN
ZUGENTLASCHE
OBEN
LG
B123
B114
B111
B112
B113
B115
B122
B129
B130

B102251

14 Bus system overview LTM1500-8.1

14.1 LSB1 overview

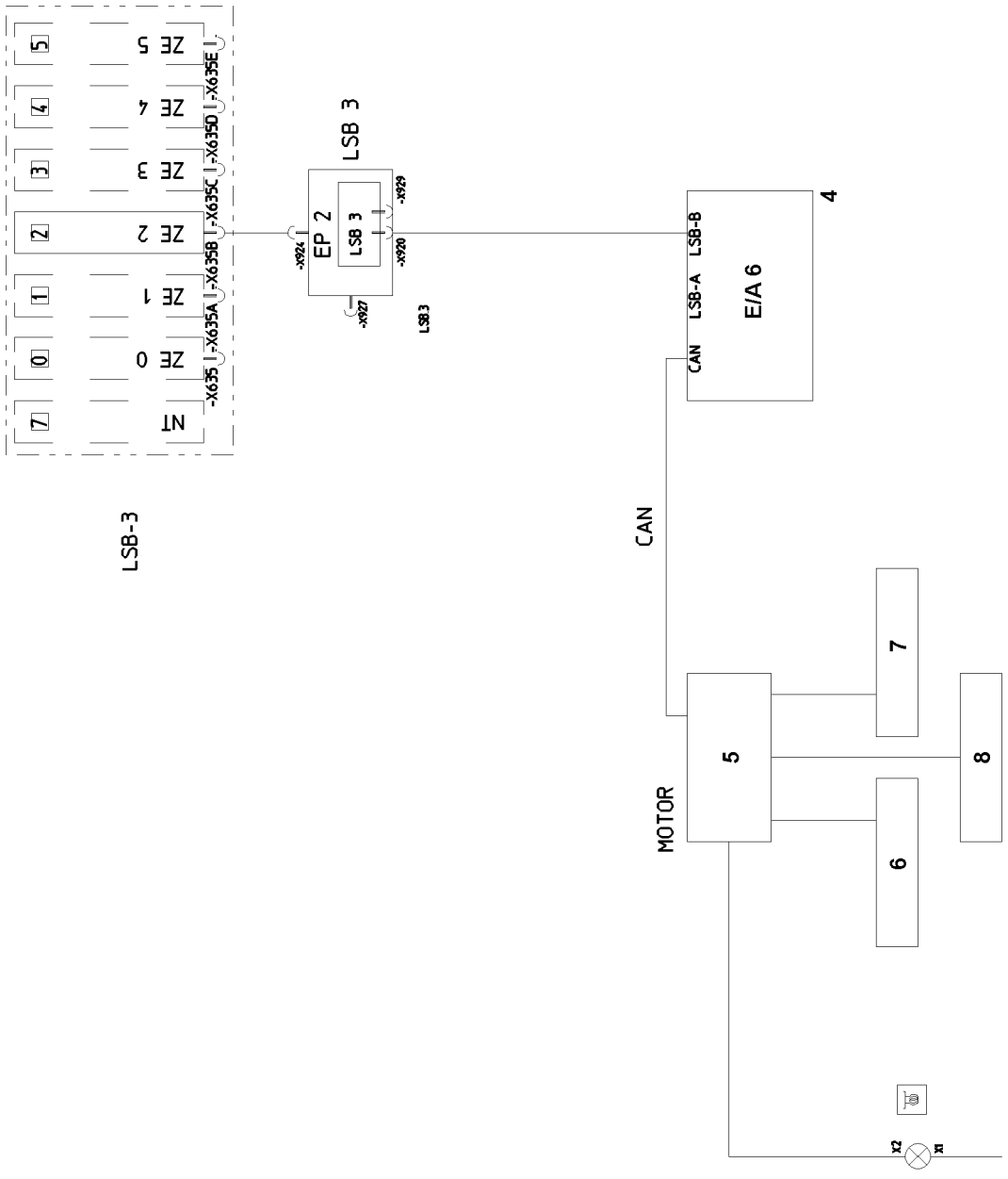
Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	Shaft encoder (DR)	Boom direction	25
2	Inductive sensor (IA)	Guying luffing jib	14
3	Inductive sensor (IA)	NA frame 3, left	10
4	Inductive sensor (IA)	Block left	11
5	Inductive sensor (IA)	in flap left	12
6	Inductive sensor (IA)	Flap, position left	13
7	Inductive sensor (IA)	Luffing jib, lower left	15
8	Tension measuring lug B (ZM)		22
9	Angle sensor (WG)	Luffing jib	29
10	Length sensor (LS)	Cylinder	30


* OPTION
OW
UW
LSB1
LSB-2
LSB2
LICCON
LIEBHERR
COMPUTED CONTROLLING
-X631A
EP 1
LSB2
-X94
-X97
-X635 -X635A -X635B -X635C -X635D -X635E
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
NT
CAN_1
CAN_2
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
M:02-116 SWX.X EA
M:03-126 SWX.X EA
M:04-136 SWX.X EA
M:05-146 SWX.X EA
M:06-156 SWX.X EA
LSB-A
LSB-B
13
14
15
16
17
18
19
20
21
22
23
B222
B223
B224
B221
S:22 SWX.XILG
S:23 SWX.XILG
S:24 SWX.XILG
S:21 SWX.XILG
LG2
LG3
LG4
LG1
LSB1
5*
6*
7*
4*

B102252

14.2 LSB2 overview

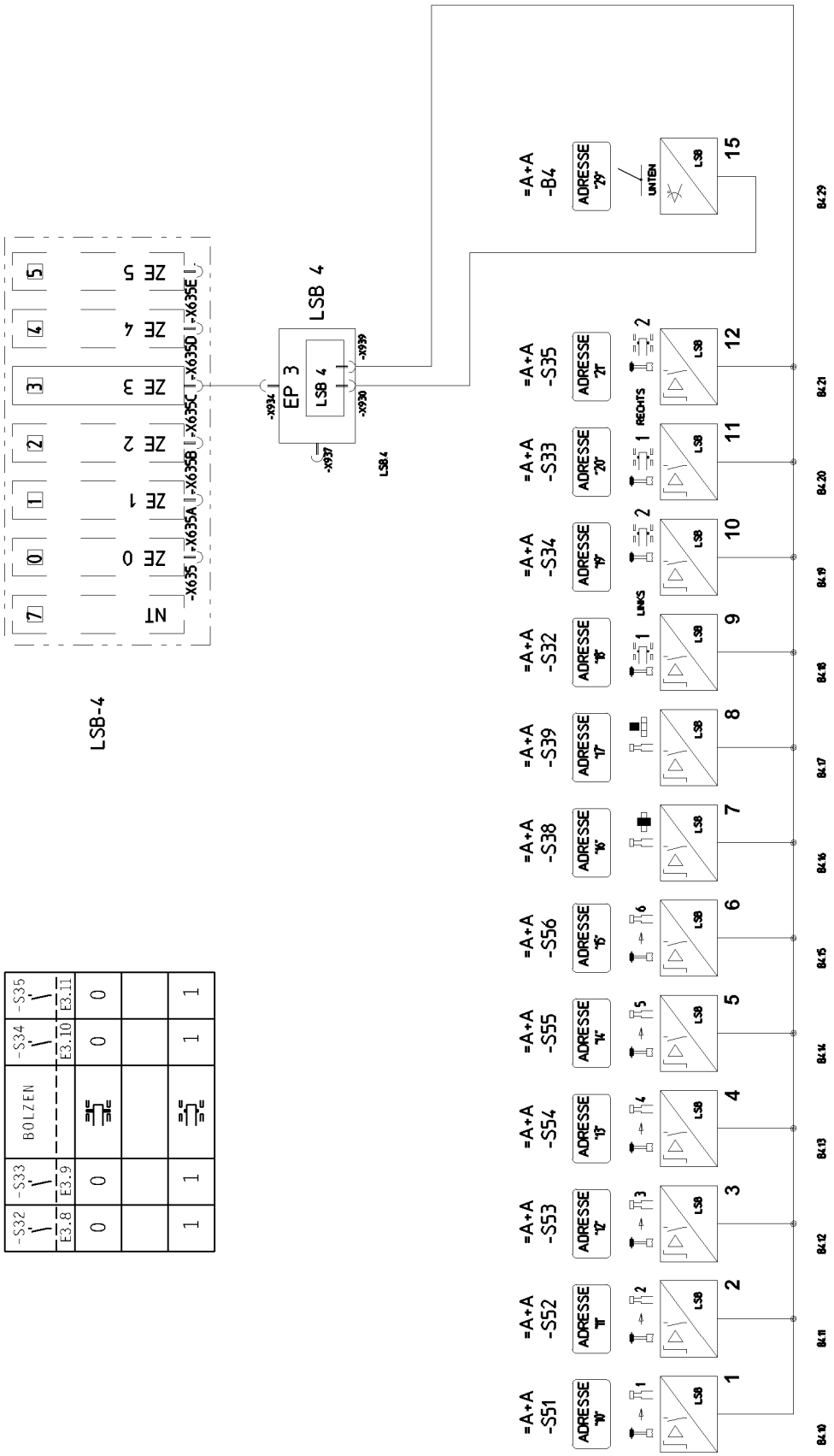
Pos.	Station		Bus address
CPU-1	Central processing unit (CPU) 1 (control cabinet)		
IPC-B1	Input printed circuit board (IPCB) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
—			
—			
4	Length sensor (LS)	Sliding beam 1, right rear	21
5	Length sensor (LS)	Sliding beam 2, front right	22
6	Length sensor (LS)	Sliding beam 3, front left	23
7	Length sensor (LS)	Sliding beam 4, left rear	24
—			
—			
13	Input/output module 1 (IO) (center console)	Axle suspension, engine, transmission, control functions, keypad unit	2
14	Input/output module 2 (IO) (center console)	Differential locks, display functions, steering superstructure	3
15	Input/output module 3 (IO) (right support box)	Right support, concentric running, tank	4
16	Input/output module 4 (IO) (left support box)	Support left, rear axle steering	5
17	Input/output module 5 (IO) (center console)	Right-hand steering column switch	6
18	Intarder EST-42 (center console)		
19	Torque converter transmission EST-41 (center console)		
20	Motor ECU		
21	TC-Tronic transmission		
22	Tachograph		
23	Tacho		


LSB-3
-X635
-X635A
-X635B
-X635C
-X635D
-X635E
NT
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
LSB 3
EP 2
LSB 3
-X924
-X927
-X929
-X920
LSB3
4
E/A 6
LSB-B
LSB-A
CAN
CAN
MOTOR
5
6
7
8
X2
X1

B102253

14.3 LSB3 overview

Pos.	Station		Bus address
CPU-2	Central processing unit (CPU) 2 (control cabinet)		1
IPC-B2	Input printed circuit board (IPCB) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
—			
—			
—			
4	Input/output module 6 (IO)		
5	Motor electrical control unit 1		
6	Radiator		
7	Engine brake		
8	Ventilation flap		

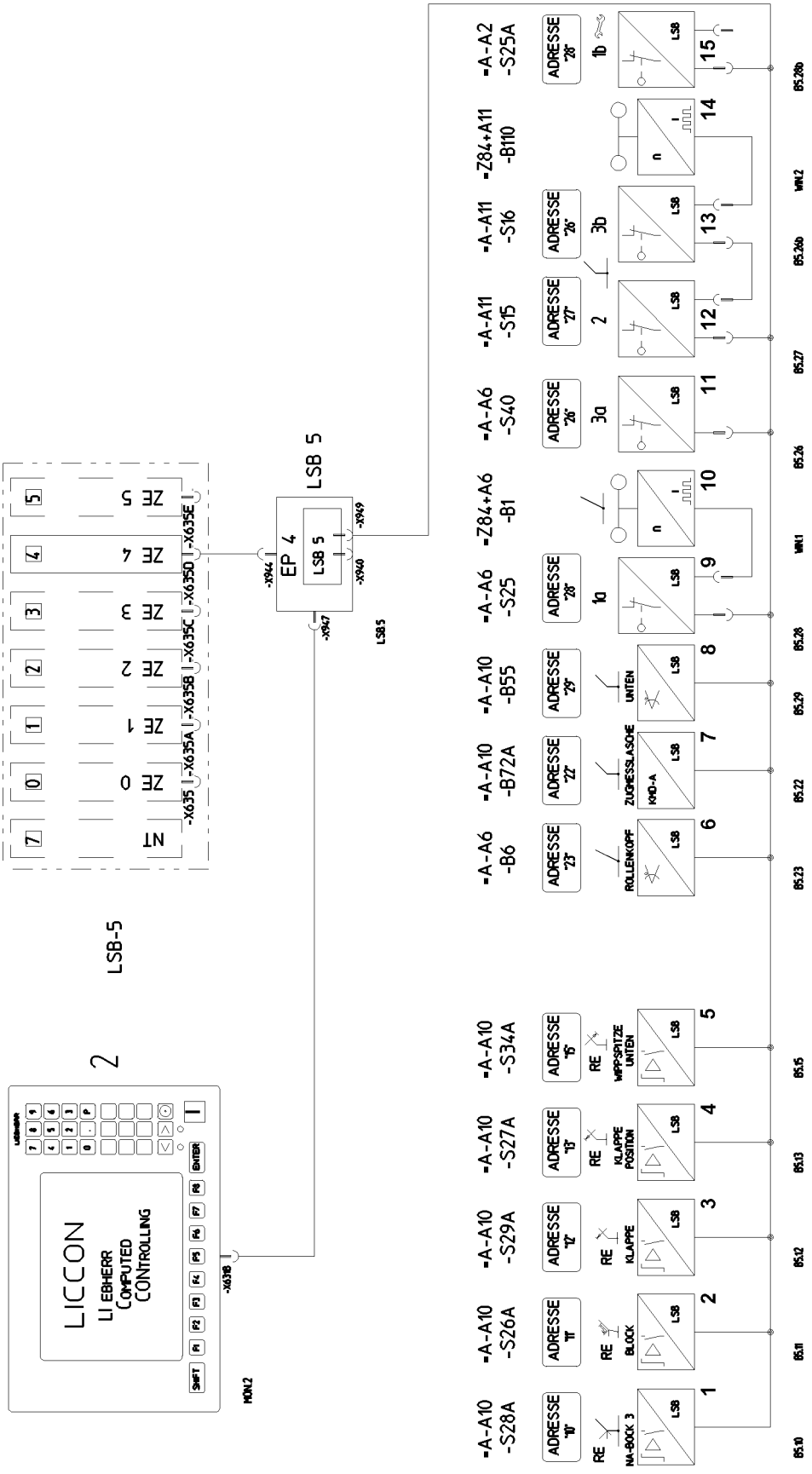


-S32	-S33	BOLZEN	-S34	-S35
E3.8	E3.9		E3.10	E3.11
0	0		0	0
1	1		1	1

B102254

14.4 LSB4 overview

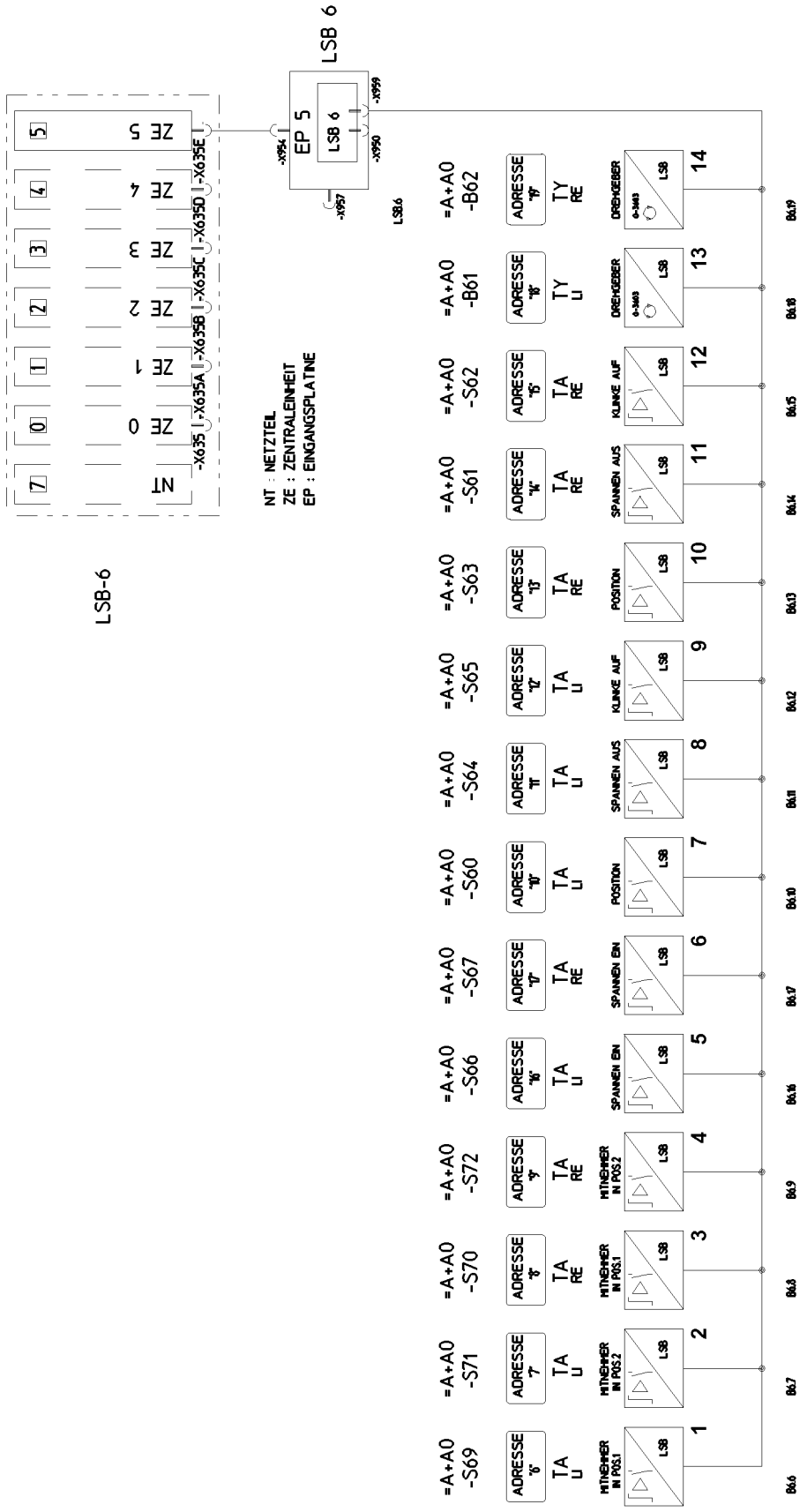
Pos.	Station		Bus address
CPU-3	Central processing unit (CPU) 3 (control cabinet)		
IPC-B3	Input printed circuit board (IPCB) 3 (control cabinet)		
LSB4	LIEBHERR-System-Bus 4		
1	Inductive sensor (IA)	Tele pinning 1	10
2	Inductive sensor (IA)	Tele pinning 2	11
3	Inductive sensor (IA)	Tele pinning 3	12
4	Inductive sensor (IA)	Tele pinning 4	13
5	Inductive sensor (IA)	Tele pinning 5	14
6	Inductive sensor (IA)	Tele pinning 6	15
7	Inductive sensor (IA)	Telescopic boom, pinned	16
8	Inductive sensor (IA)	Telescopic boom, unpinned	17
9	Inductive sensor (IA)	Cylinder 1 unpinned, left	18
10	Inductive sensor (IA)	Cylinder 2 unpinned, left	19
11	Inductive sensor (IA)	Cylinder 1 unpinned, right	20
12	Inductive sensor (IA)	Cylinder 2 unpinned, right	21
—			
—			
15	Angle sensor (WG)	Telescopic boom	29


LICCON
LI EBHERR
COMPUTED
CONTROLLING
LSB-5
2
MON2
-X635B
EP 4
LSB 5
-X944
-X947
-X949
-X940
LSB5
-X635
-X635A
-X635B
-X635C
-X635D
-X635E
NT
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
-A-A10 -S28A
-A-A10 -S26A
-A-A10 -S29A
-A-A10 -S27A
-A-A10 -S34A
-A-A6 -B6
-A-A10 -B72A
-A-A10 -B55
-A-A6 -S25
-Z84+A6 -B1
-A-A6 -S40
-A-A11 -S15
-A-A11 -S16
-Z84+A11 -B110
-A-A2 -S25A
ADRESSE "10"
ADRESSE "11"
ADRESSE "12"
ADRESSE "13"
ADRESSE "15"
ADRESSE "23"
ADRESSE "22"
ADRESSE "29"
ADRESSE "28"
ADRESSE "26"
ADRESSE "27"
ADRESSE "26"
ADRESSE "26"
RE
NA-BOCK 3
BLOCK
KLAPPE
KLAPPE POSITION
WIPPSPITZE UNTEN
ROLLENKOPF
ZUGMESSLASCHE
KMO-A
UNTEN
LSB
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
1a
1b
2
3a
3b
n
I
65.10
65.11
65.12
65.13
65.15
65.23
65.22
65.29
65.28
MIN1
65.26
65.27
65.260
MIN2
65.280

B102255

14.5 LSB5 overview

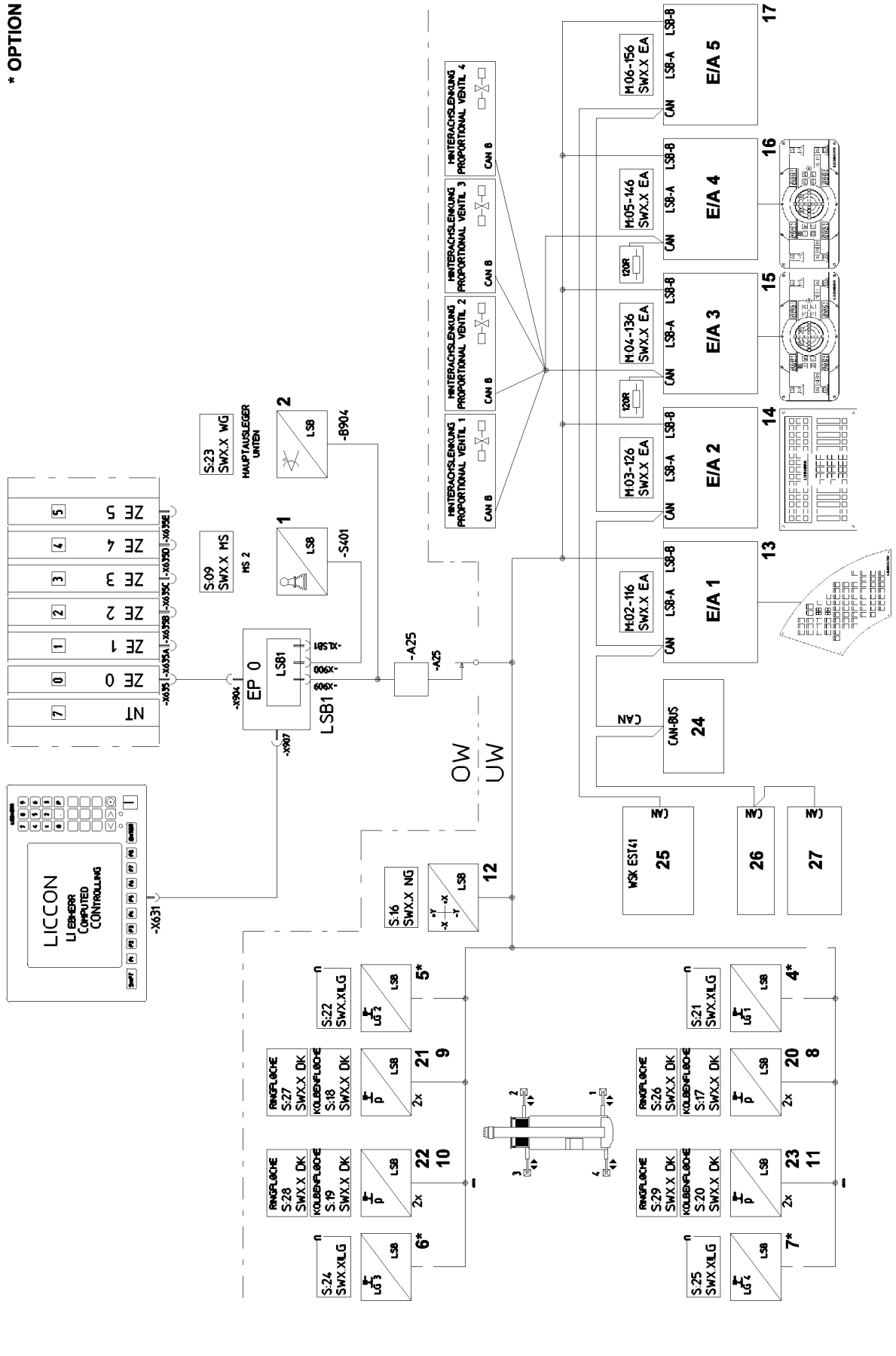
Pos.	Station		Bus address
CPU-4	Central processing unit (CPU) 4 (control cabinet)		1
IPC-B4	Input printed circuit board (IPCB) 4 (control cabinet)		
LSB5	LIEBHERR-System-Bus 5		
1	Inductive sensor (IA)	NA frame 3, right	10
2	Inductive sensor (IA)	Block right	11
3	Inductive sensor (IA)	Flap right	12
4	Inductive sensor (IA)	Flap in position, right	13
5	Inductive sensor (IA)	Luffing jib bottom right	15
6	Angle sensor (WG)	Tele head	23
7	Tension measuring lug A		22
8	Angle sensor (WG)	Articulated piece luffing jib	29
9	Hoist limit switch (HO) 1a	Boom head	28
10	Wind sensor		
11	Hoist limit switch (HO) 3a	Boom nose / 2nd hoist top or auxiliary boom	26
12	Hoist limit switch (HO) 2	Boom head	27
13	Hoist limit switch (HO) 3b	Boom nose / 2nd hoist top or auxiliary boom	26
14	Wind sensor		
15	Hoist limit switch (HO) 1b	Tele 2	28


LSB-6
NT : NETZTEIL
ZE : ZENTRALEINHEIT
EP : EINGANGSPLATINE
LSB 6
EP 5
LSB 6
-X635 -X635A -X635B -X635C -X635D -X635E
NT
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
=A+A0 -S69
=A+A0 -S71
=A+A0 -S70
=A+A0 -S72
=A+A0 -S66
=A+A0 -S67
=A+A0 -S60
=A+A0 -S64
=A+A0 -S65
=A+A0 -S63
=A+A0 -S61
=A+A0 -S62
=A+A0 -B61
=A+A0 -B62
ADRESSE '6'
ADRESSE '7'
ADRESSE '8'
ADRESSE '9'
ADRESSE '16'
ADRESSE '17'
ADRESSE '10'
ADRESSE '11'
ADRESSE '12'
ADRESSE '13'
ADRESSE '14'
ADRESSE '15'
ADRESSE '18'
ADRESSE '19'
TA LI
TA RE
MITNEHMER IN POS.1
MITNEHMER IN POS.2
SPANNEN EIN
POSITION
SPANNEN AUS
KLINKE AUF
DREHGEBER
LSB
1
2
3
4
5
6
7
8
9
10
11
12
13
14
B6.6
B6.7
B6.8
B6.9
B6.16
B6.17
B6.10
B6.11
B6.12
B6.13
B6.14
B6.15
B6.18
B6.19

B102256

14.6 LSB6 overview

Pos.	Station		Bus address
CPU-5	Central processing unit (CPU) 5 (control cabinet)		1
IPC-B5	Input printed circuit board (IPCB) 5 (control cabinet)		
LSB6	LIEBHERR-System-Bus 6		
1	Inductive sensor (IA)	TA actuator in position 1, left	6
2	Inductive sensor (IA)	TA actuator in position 2, left	7
3	Inductive sensor (IA)	TA actuator in position 1, right	8
4	Inductive sensor (IA)	TA actuator in position 2, right	9
5	Inductive sensor (IA)	TA tension cylinder retracted, left	16
6	Inductive sensor (IA)	TA tension cylinder retracted, right	17
7	Inductive sensor (IA)	TA in position, left	10
8	Inductive sensor (IA)	TA tension cylinder extended, left	11
9	Inductive sensor (IA)	TA latch open, left	12
10	Inductive sensor (IA)	TA in position, right	13
11	Inductive sensor (IA)	TA tension cylinder extended, right	14
12	Inductive sensor (IA)	TA latch open, right	15
13	Shaft encoder (DR)	TY control cylinder, left	18
14	Inductive sensor (IA)	TY control cylinder, right	19

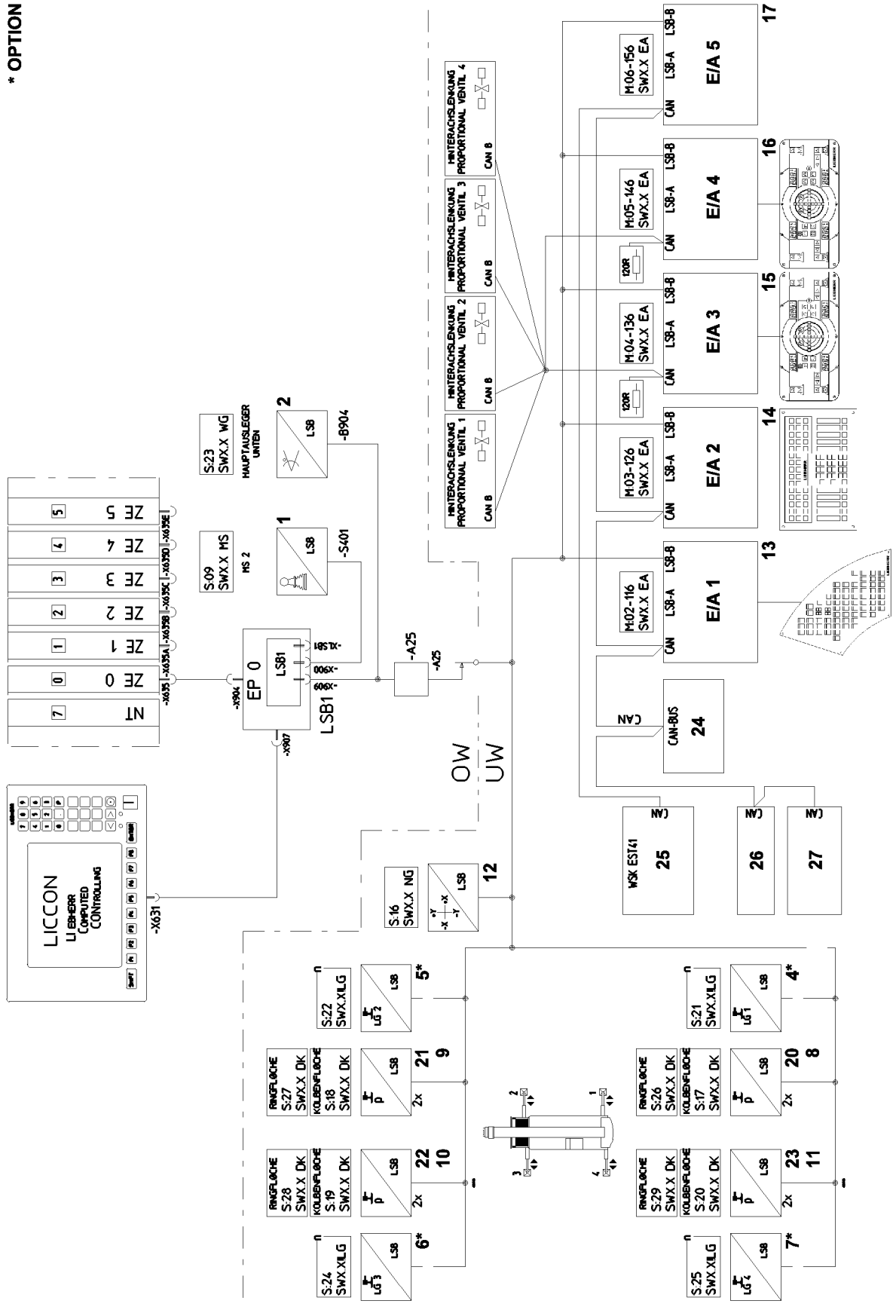

* OPTION
LICCON
LIEBHERR COMPUTED CONTROLLING
-X631
EP 0
LSB1
-A25
OW
UW
CAN-BUS
24
WSK EST41
25
26
27
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
M02-116 SWX.X EA
M03-126 SWX.X EA
M04-136 SWX.X EA
M05-146 SWX.X EA
M06-156 SWX.X EA
120R
HINTERACHSLENKUNG PROPORTIONAL VENTIL 1
HINTERACHSLENKUNG PROPORTIONAL VENTIL 2
HINTERACHSLENKUNG PROPORTIONAL VENTIL 3
HINTERACHSLENKUNG PROPORTIONAL VENTIL 4
S:09 SWX.X MS
S:23 SWX.X WG
HAUPTAUSLEGER UNTEN
-S401
-B904
S:16 SWX.X NG
S:21 SWX.XLG
S:22 SWX.XLG
S:24 SWX.XLG
S:25 SWX.XLG
RINGFLÄCHE S:26 SWX.X DK
KOLBENFLÄCHE S:17 SWX.X DK
RINGFLÄCHE S:27 SWX.X DK
KOLBENFLÄCHE S:18 SWX.X DK
RINGFLÄCHE S:28 SWX.X DK
KOLBENFLÄCHE S:19 SWX.X DK
RINGFLÄCHE S:29 SWX.X DK
KOLBENFLÄCHE S:20 SWX.X DK
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
NT

B198537

15 Bus system overview LG1750

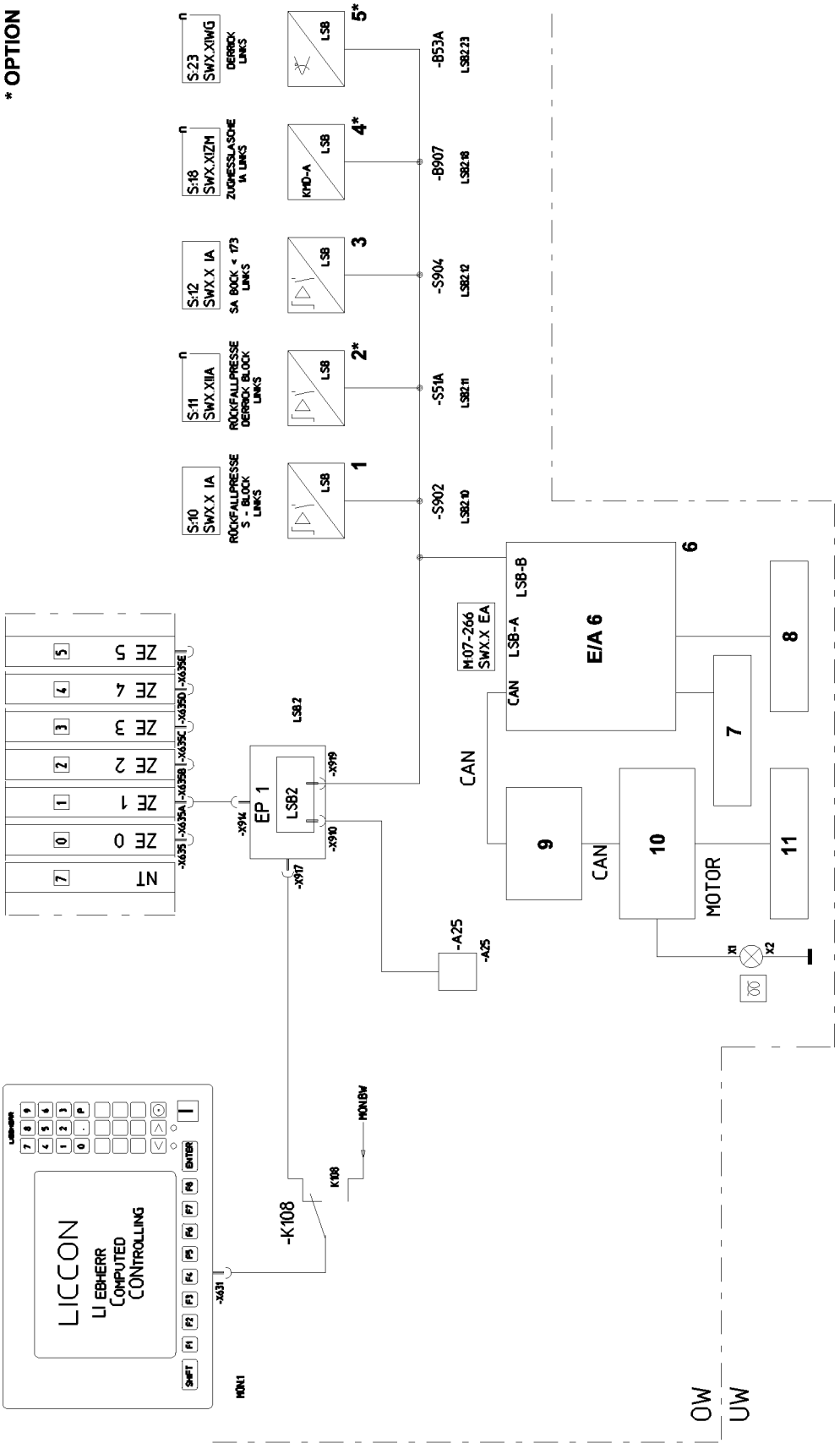
15.1 LSB1 overview

Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	Master switch 2 (MS2)		
2	Angle sensor (AS)	Main boom bottom	23
3	not assigned		
4	Length sensor (LS)	Sliding beam 1, rear right	21
5	Length sensor (LS)	Sliding beam 2, front right	22
6	Length sensor (LS)	Sliding beam 3, front left	24
7	Length sensor (LS)	Sliding beam 4, rear left	25
8	Pressure sensor, piston surface (PS)	Support cylinder, rear right	17
9	Pressure sensor, piston surface (PS)	Support cylinder, front right	18
10	Pressure sensor, piston surface (PS)	Support cylinder, front left	19
11	Pressure sensor, piston surface (PS)	Support cylinder, rear left	20
12	Inclination sensor (IS)		16
13	Input/output module 1 (IO) (center console)		2
14	Input/output module 2 (IO) (center console)		3
15	Input/output module 3 (IO) (right support box)	Right support control unit	4


* OPTION
LICCON
LIEBHERR COMPUTED CONTROLLING
-X631
-X635
-X635A
-X635B
-X635C
-X635D
-X635E
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
NT
EP 0
LSB1
-X904
-X906
-X907
-XLSB1
-A25
S:09 SWX.X MS
MS 2
-S401
S:23 SWX.X WG
HAUPTAUSLEGER UNTEN
-B904
HINTERACHSLENKUNG PROPORTIONAL VENTIL 1
HINTERACHSLENKUNG PROPORTIONAL VENTIL 2
HINTERACHSLENKUNG PROPORTIONAL VENTIL 3
HINTERACHSLENKUNG PROPORTIONAL VENTIL 4
CAN B
M:02-116 SWX.X EA
M:03-126 SWX.X EA
M:04-136 SWX.X EA
M:05-146 SWX.X EA
M:06-156 SWX.X EA
120R
CAN
LSB-A
LSB-B
E/A 1
E/A 2
E/A 3
E/A 4
E/A 5
13
14
15
16
17
CAN-BUS
24
WSK EST41
25
26
27
OW
UW
S:16 SWX.X NG
12
S:22 SWX.XLG
S:24 SWX.XLG
S:21 SWX.XLG
S:25 SWX.XLG
5*
6*
4*
7*
RINGFLÄCHE S:27 SWX.X DK
KOLBENFLÄCHE S:18 SWX.X DK
RINGFLÄCHE S:28 SWX.X DK
KOLBENFLÄCHE S:19 SWX.X DK
RINGFLÄCHE S:26 SWX.X DK
KOLBENFLÄCHE S:17 SWX.X DK
RINGFLÄCHE S:29 SWX.X DK
KOLBENFLÄCHE S:20 SWX.X DK
21
9
22
10
20
8
23
11
2x
LSB
LG1
LG2
LG3
LG4
p
n

B198537

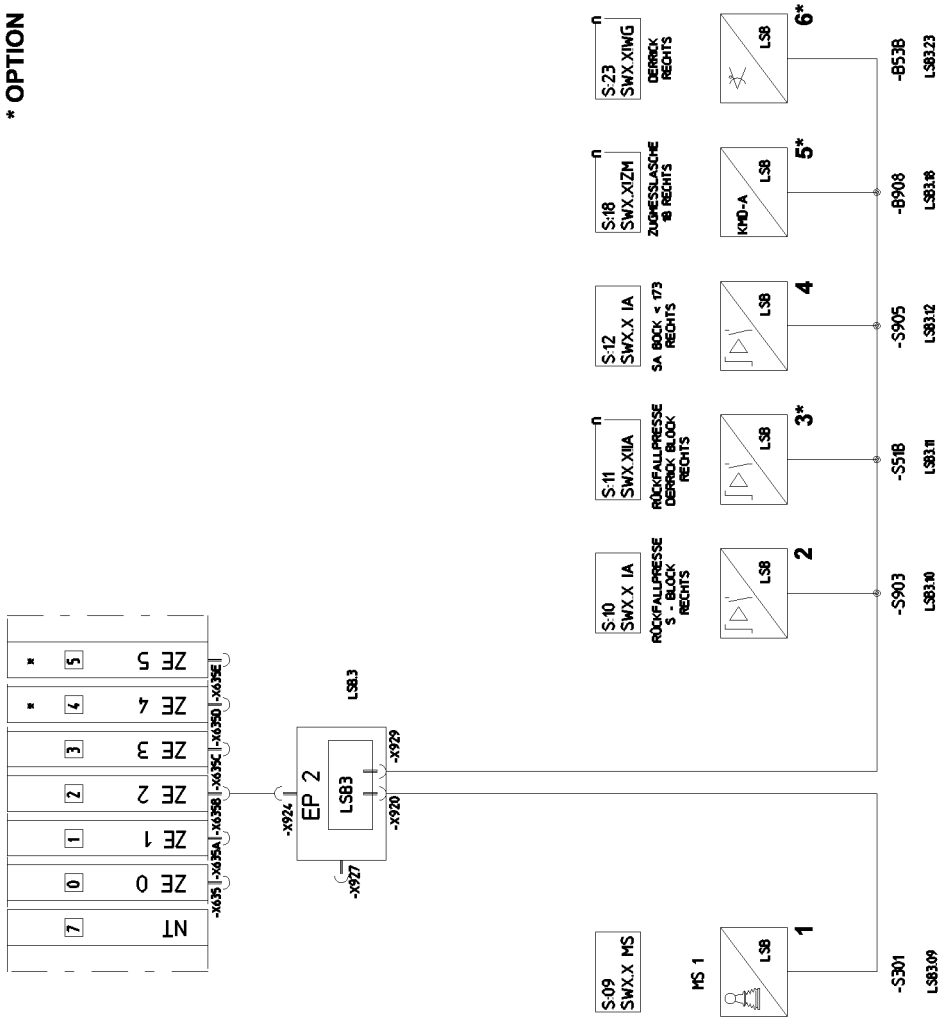
Pos.	Station		Bus address
16	Input/output module 4 (IO) (left support box)	Left support control unit	5
17	Input/output module 5 (IO) (center console)		6
18	not assigned		
19	not assigned		
20	Pressure sensor, ring surface (PS)	Support cylinder, rear right	26
21	Pressure sensor, ring surface (PS)	Support cylinder, front right	27
22	Pressure sensor, ring surface (PS)	Support cylinder, front left	28
23	Pressure sensor, ring surface (PS)	Support cylinder, rear left	29
24	Motor electrical control unit (center console)		
25	WSK EST41 (center console)		
26	Wheel speed (center console)		
27	TC-Tronic transmission		


* OPTION
S:10 SWX.X IA
ROCKFALLPRESSE S - BLOCK LINKS
S:11 SWX.XIIA
ROCKFALLPRESSE DERRICK BLOCK LINKS
S:12 SWX.X IA
SA BOCK < t73 LINKS
S:18 SWX.XIZM
ZUGMESSLASCHE IA LINKS
S:23 SWX.XIWG
DERRICK LINKS
-S902
-S51A
-S904
-B907
-B53A
LSB2.10
LSB2.11
LSB2.12
LSB2.18
LSB2.23
1
2*
3
4*
5*
KHD-A
M107-266 SWX.X EA
E/A 6
LSB-A
LSB-B
CAN
6
7
8
9
10
11
MOTOR
EP 1
LSB2
-X914
-X919
-X910
-X917
-A25
-X635
-X635A
-X635B
-X635C
-X635D
-X635E
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
NT
-K108
K108
MONBW
-X631
LICCON
LI EBHERR COMPUTED CONTROLLING
MON1
OW
UW

B198538

15.2 LSB2 overview

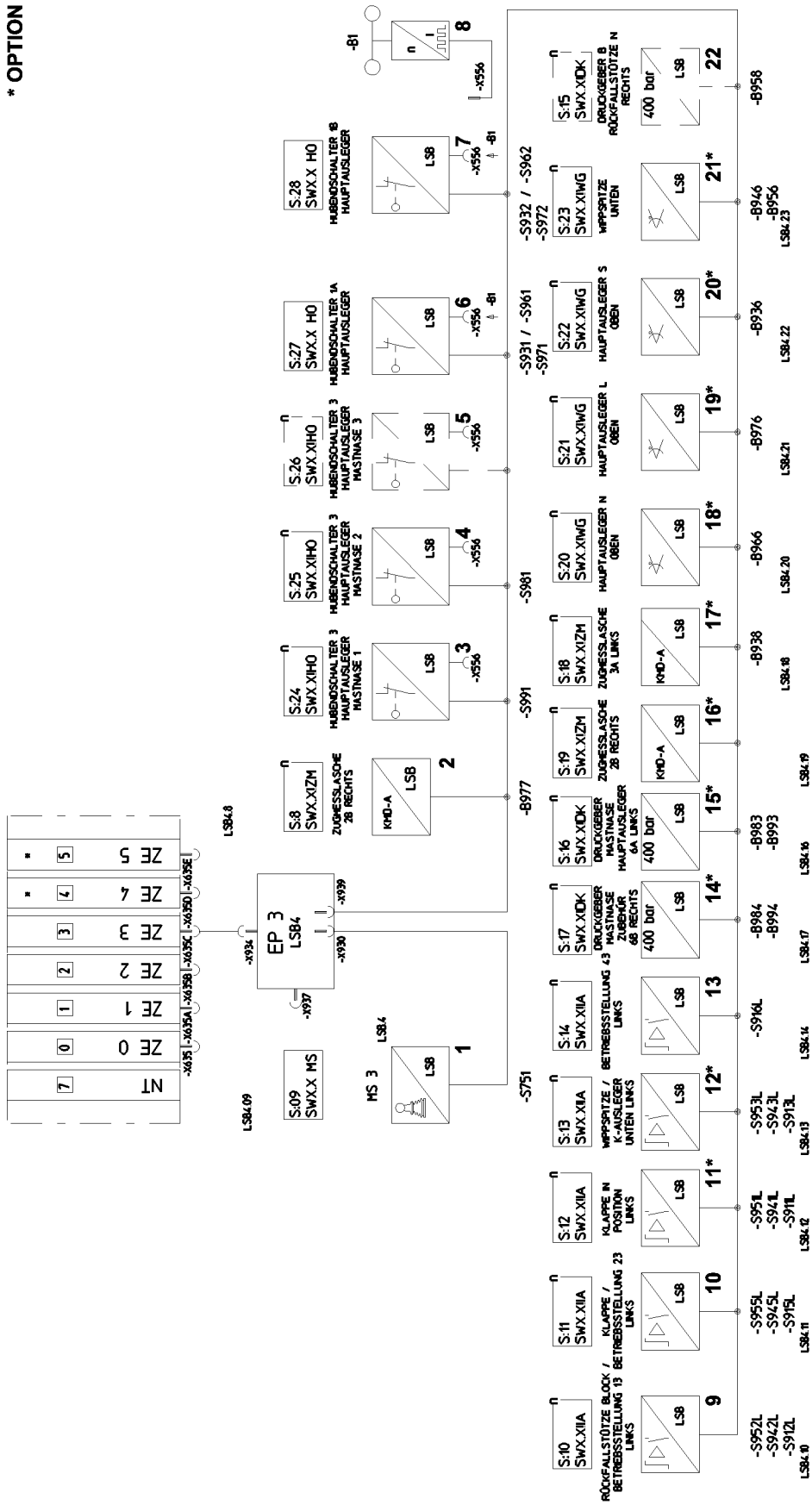
Pos.	Station		Bus address
CPU-1	Central processing unit (CPU) 1 (control cabinet)		1
IPC-B1	Input printed circuit board (IPCB) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
1	Inductive sensor (IS)	Relapse cylinder S block left	10
2	Inductive sensor (IS)	Relapse cylinder derrick block left	11
3	Inductive sensor (IS)	SA-bracket < 17° left	12
4	Tension measuring lug (TM)	1A left	18
5	Angle sensor (AS)	Derrick left	23
6	Input/output module 6 (IO)	Fan coupling, exhaust flap retention strap, ventilation flap	7
7	Exhaust flap retention strap		
8	Ventilation flap		
9	CAN bus neutral point		
10	Motor electrical control unit 1		
11	Flame starting device		


* OPTION
NT
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
-X635
-X635A
-X635B
-X635C
-X635D
-X635E
-X924
EP 2
LSB3
-X927
-X929
-X920
S:09 SWX.X MS
MS 1
S:10 SWX.X IA
ROCKFALLPRESSE S - BLOCK RECHTS
S:11 SWX.XIIA
ROCKFALLPRESSE DERRICK BLOCK RECHTS
S:12 SWX.X IA
SA BOCK < 173 RECHTS
S:18 SWX.XIZM
ZUGMESSLASCHE SB RECHTS
S:23 SWX.XIWG
DERRICK RECHTS
LSB
-S301
LSB3.09
-S903
LSB3.10
-S518
LSB3.11
-S905
LSB3.12
-B908
LSB3.18
-B53B
LSB3.23
1
2
3*
4
5*
6*
KMD-A

B198539

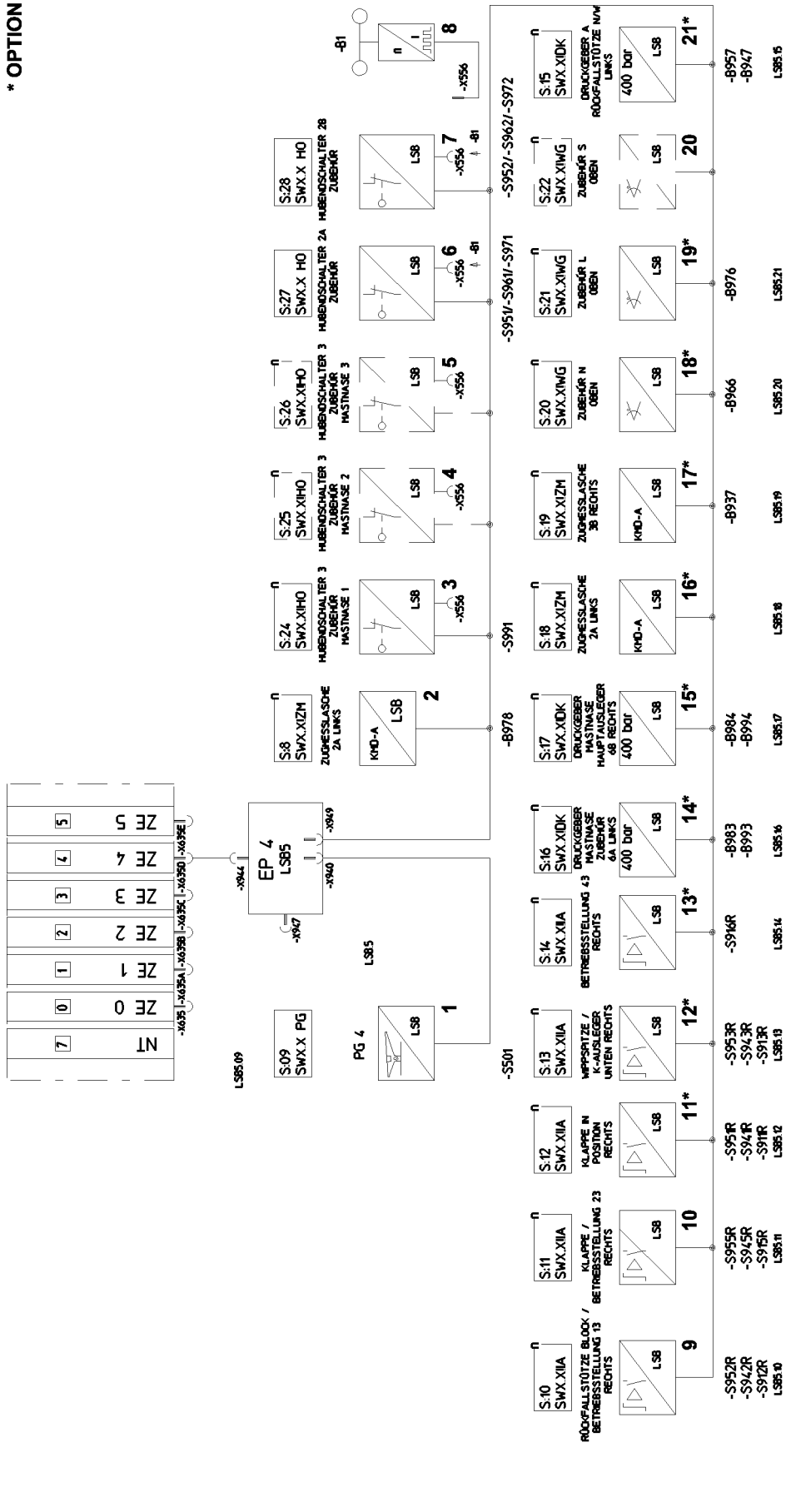
15.3 LSB3 overview

Pos.	Station		Bus address
CPU-2	Central processing unit (CPU) 2 (control cabinet)		1
IPC-B2	Input printed circuit board (IPCB) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
1	Master switch 1 (MS1)		9
2	Inductive sensor (IS)	Release press S block right	10
3	Inductive sensor (IS)	Relapse cylinder derrick block right	11
4	Inductive sensor (IS)	SA-bracket < 17° right	12
5	Tension measuring lug (TM)	1B right	18
6	Angle sensor (AS)	Derrick right	23


* OPTION
NT
ZE 0
ZE 1
ZE 2
ZE 3
ZE 4
ZE 5
EP 3
LSB4
MS 3
S:09 SWX.X MS
S:8 SWX.XIZM
ZUGMESSLASCHE 2B RECHTS
S:24 SWX.XIHO
HUBENDSCHALTER 3 HAUPTAUSLEGER MASTNASE 1
S:25 SWX.XIHO
HUBENDSCHALTER 3 HAUPTAUSLEGER MASTNASE 2
S:26 SWX.XIHO
HUBENDSCHALTER 3 HAUPTAUSLEGER MASTNASE 3
S:27 SWX.X HO
HUBENDSCHALTER 1A HAUPTAUSLEGER
S:28 SWX.X HO
HUBENDSCHALTER 1B HAUPTAUSLEGER
S:10 SWX.XIIA
RÜCKFALLSTÜTZE BLOCK / BETREBSSTELLUNG 13 LINKS
S:11 SWX.XIIA
KLAPPE / BETREBSSTELLUNG 23 LINKS
S:12 SWX.XIIA
KLAPPE IN POSITION LINKS
S:13 SWX.XIIA
WIPPSPITZE / K-AUSLEGER UNTEN LINKS
S:14 SWX.XIIA
BETREBSSTELLUNG 43 LINKS
S:17 SWX.XIOK
DRUCKGEBER MASTNASE ZUBEHÖR 4B RECHTS
S:16 SWX.XIOK
DRUCKGEBER MASTNASE HAUPTAUSLEGER 6A LINKS
S:19 SWX.XIZM
ZUGMESSLASCHE 2B RECHTS
S:18 SWX.XIZM
ZUGMESSLASCHE 3A LINKS
S:20 SWX.XIWG
HAUPTAUSLEGER N OBEN
S:21 SWX.XIWG
HAUPTAUSLEGER L OBEN
S:22 SWX.XIWG
HAUPTAUSLEGER S OBEN
S:23 SWX.XIWG
WIPPSPITZE UNTEN
S:15 SWX.XIOK
DRUCKGEBER B RÜCKFALLSTÜTZE N RECHTS
-S751
-S977
-S991
-S981
-S931 / -S961
-S971
-S932 / -S962
-S972
-B977
-B991
-B981
-B931 / -B961
-B971
-B932 / -B962
-B972
-B958
-B946
-B956
-B936
-B976
-B966
-B938
-B983
-B993
-B984
-B994
-S916L
-S953L
-S943L
-S913L
-S951L
-S941L
-S911L
-S955L
-S945L
-S915L
-S952L
-S942L
-S912L
400 bar
KMD-A
LSB
B198540

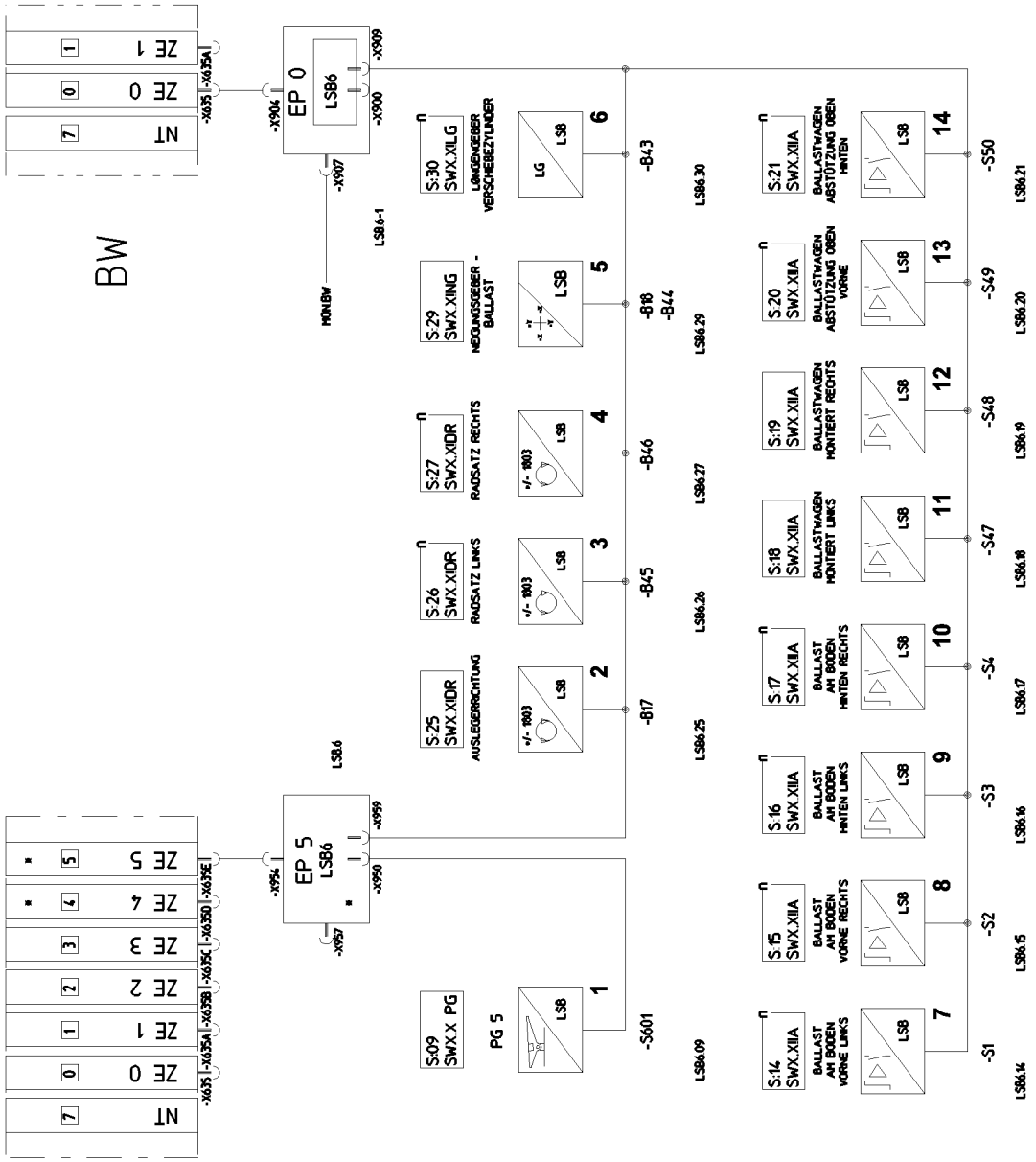
15.4 LSB4 overview

Pos.	Station		Bus address
CPU-3	Central processing unit (CPU) 3 (control cabinet)		1
IPC-B3	Input printed circuit board (IPCB) 3 (control cabinet)		
LSB4	LIEBHERR-System-Bus 4		
1	Master switch 3 (MS3)		9
2	Tension measuring lug (TM)	2B right	8
3	Hoist limit switch (HO) 3	Main boom, boom nose 1	24
4	Hoist limit switch (HO) 3	Main boom, boom nose 2	25
5	Hoist limit switch (HO) 3	Main boom, boom nose 3	26
6	Hoist limit switch (HO) 1A	Main boom	27
7	Hoist limit switch (HO) 1B	Main boom	28
8	Wind sensor		
9	Inductive sensor (IS)	Relapse support block / operating position 1° left	10
10	Inductive sensor (IS)	Flap / operating position 2° left	11
11	Inductive sensor (IS)	Flap in position left	12
12	Inductive sensor (IS)	Luffing jib / K-boom bottom left	13
13	Inductive sensor (IS)	Operating position 4° left	14
14	Pressure sensor (PS)	Boom nose, accessory 6B right	17
15	Pressure sensor (PS)	Boom nose, main boom 6A left	16
16	Tension measuring lug (TM)	2B right	19
17	Tension measuring lug (TM)	3A left	18
18	Angle sensor (AS)	Main boom N top	20
19	Angle sensor (AS)	Main boom L top	21
20	Angle sensor (AS)	Main boom S top	22
21	Angle sensor (AS)	Luffing jib bottom	23
22	Pressure sensor B (PS)	Relapse support N right	15


* OPTION
B198541

15.5 LSB5 overview

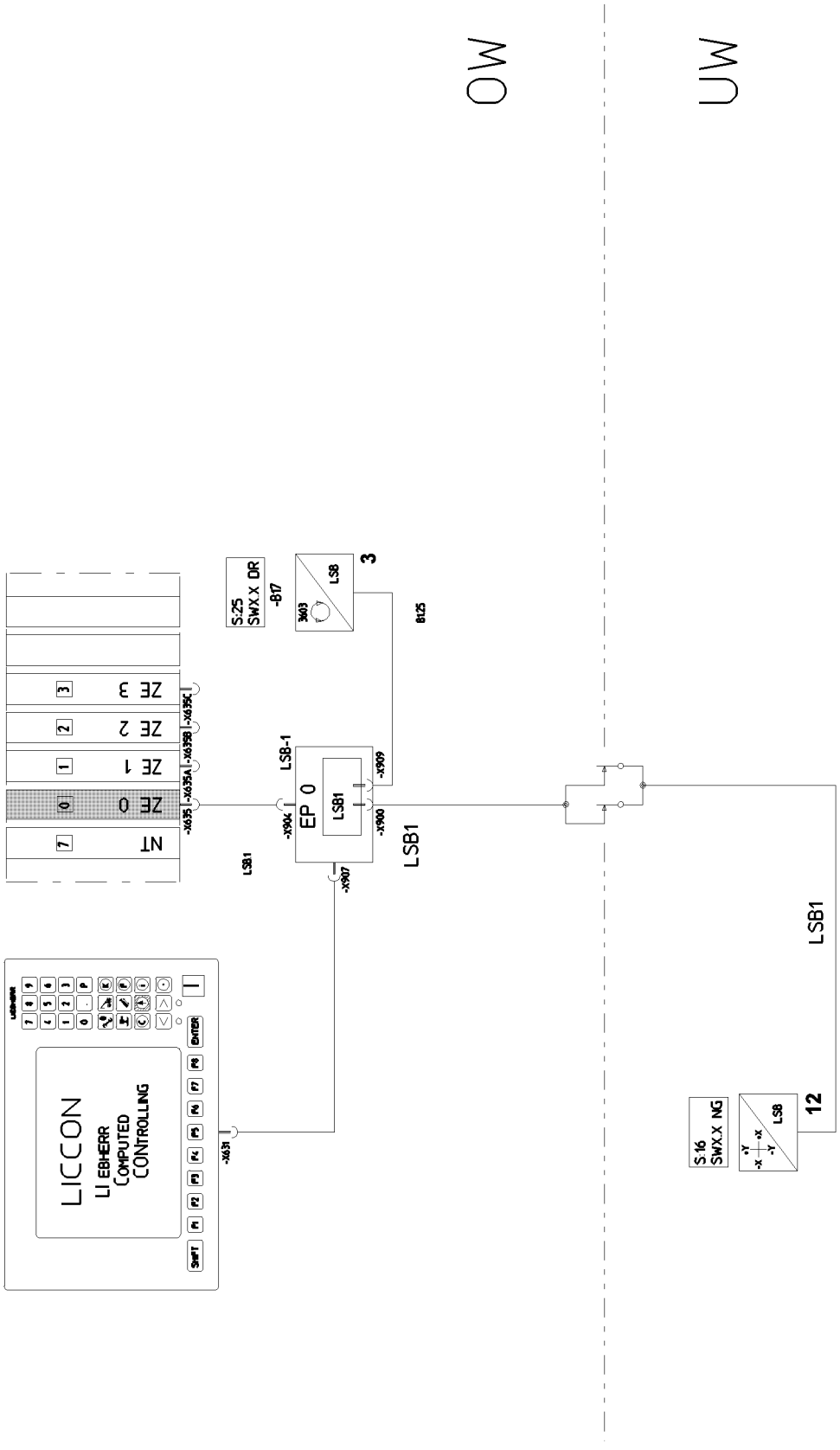
Pos.	Station		Bus address
CPU-4	Central processing unit (CPU) 4 (control cabinet)		1
IPC-B4	Input printed circuit board (IPCB) 4 (control cabinet)		
LSB5	LIEBHERR-System-Bus 5		
1	Pedal sensor 4 (PS)		9
2	Tension measuring lug (TM)	2A left	8
3	Hoist limit switch (HO) 3	Accessory, boom nose 1	24
4	Hoist limit switch (HO) 3	Accessory, boom nose 2	25
5	Hoist limit switch (HO) 3	Accessory, boom nose 3	26
6	Hoist limit switch (HO) 2A	Accessories	27
7	Hoist limit switch (HO) 2B	Accessories	28
8	Wind sensor		
9	Inductive sensor (IS)	Relapse support block / operating position 1° right	10
10	Inductive sensor (IS)	Flap / operating position 2° right	11
11	Inductive sensor (IS)	Flap in position right	12
12	Inductive sensor (IS)	Luffing jib / K-boom bottom right	13
13	Inductive sensor (IS)	Operating position 4° right	14
14	Pressure sensor (PS)	Boom nose, accessory 6A left	16
15	Pressure sensor (PS)	Boom nose, main boom, 6B right	17
16	Tension measuring lug (TM)	2A left	18
17	Tension measuring lug (TM)	3B right	19
18	Angle sensor (AS)	Accessory N top	20
19	Angle sensor (AS)	Accessory L top	21
20	Angle sensor (AS)	Accessory S top	22
21	Pressure sensor A (PS)	Relapse support N/W left	15


BW
EP 0
LS86
EP 5
LS86
ZE 1
ZE 0
NT
ZE 5
ZE 4
ZE 3
ZE 2
ZE 1
ZE 0
NT
MONIBW
LS86-1
LS86
PG 5
S:09 SWX.X PG
S:25 SWX.XIOR AUSLEGERRICHTUNG
S:26 SWX.XIOR RADSATZ LINKS
S:27 SWX.XIOR RADSATZ RECHTS
S:29 SWX.XING NEIGUNGSGEBER - BALLAST
S:30 SWX.XILG LÄNGENGEBER VERSCHIEBEZYLINDER
S:14 SWX.XIIA BALLAST AM BODEN VORNE LINKS
S:15 SWX.XIIA BALLAST AM BODEN VORNE RECHTS
S:16 SWX.XIIA BALLAST AM BODEN HINTEN LINKS
S:17 SWX.XIIA BALLAST AM BODEN HINTEN RECHTS
S:18 SWX.XIIA BALLASTWAGEN MONTIERT LINKS
S:19 SWX.XIIA BALLASTWAGEN MONTIERT RECHTS
S:20 SWX.XIIA BALLASTWAGEN ABSTÜTZUNG OBEN VORNE
S:21 SWX.XIIA BALLASTWAGEN ABSTÜTZUNG OBEN HINTEN
-S601
-S1
-S2
-S3
-S4
-S47
-S48
-S49
-S50
-B17
-B45
-B46
-B16
-B44
-B43
LS86.09
LS86.14
LS86.15
LS86.16
LS86.17
LS86.18
LS86.19
LS86.20
LS86.21
LS86.25
LS86.26
LS86.27
LS86.29
LS86.30

B198542

15.6 LSB6 overview

Pos.	Station		Bus address
CPU-5	Central processing unit (CPU) 5 (control cabinet)		1
IPC-B5	Input printed circuit board (IPCB) 5 (control cabinet)		
LSB6	LIEBHERR-System-Bus 6		
1	Pedal sensor 5 (PS5)		9
2	Shaft encoder (SE)	Direction of boom	25
3	Shaft encoder (SE)	Wheel assembly left	26
4	Shaft encoder (SE)	Wheel assembly right	27
5	Inclination sensor (IS)	Ballast	29
6	Length sensor (LS)	Sliding cylinder	30
7	Inductive sensor (IS)	Ballast on ground left front	14
8	Inductive sensor (IS)	Ballast on ground right front	15
9	Inductive sensor (IS)	Ballast on ground left rear	16
10	Inductive sensor (IS)	Ballast on ground right rear	17
11	Inductive sensor (IS)	Ballast trailer installed left	18
12	Inductive sensor (IS)	Ballast trailer installed right	19
13	Inductive sensor (IS)	Ballast trailer support top front	20
14	Inductive sensor (IS)	Ballast trailer support top rear	21

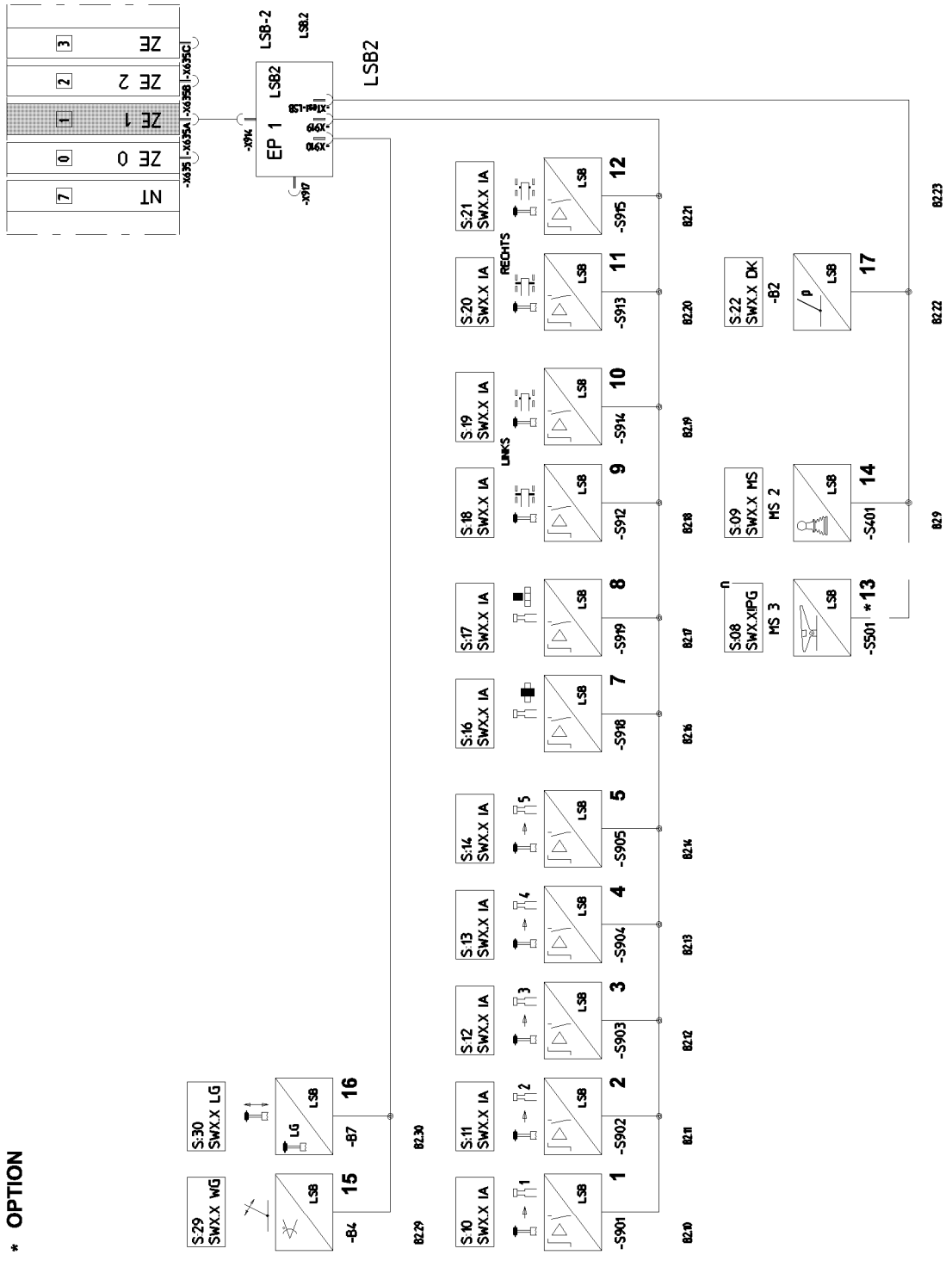

OW
UW
S:25
SWX.X DR
-B17
LSB
3
LSB-1
EP 0
LSB1
-X904
-X909
-X900
-X907
LSB1
LSB1
ZE 3
ZE 2
ZE 1
ZE 0
NT
-X635C
-X635B
-X635A
-X635
LICCON
EBHERR
COMPUTED
CONTROLLING
-X631
LSB1
S:16
SWX.X NG
LSB
12

B198609

16 Bus system overview LTR1100

16.1 LSB1 overview

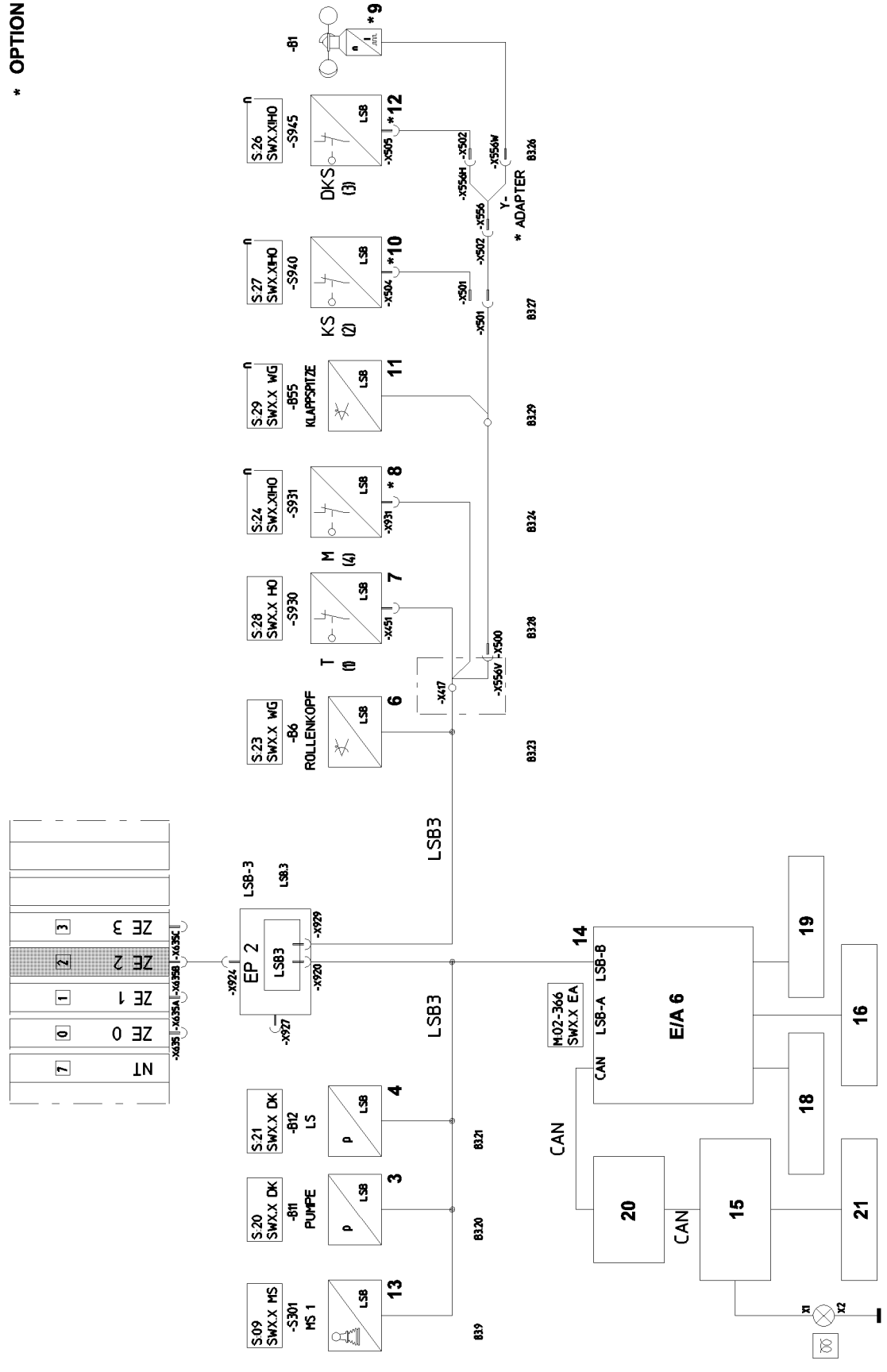
Pos.	Station		Bus address
CPU0	Central processing unit (CPU) 0 (control cabinet)		1
IPCB-0	Input printed circuit board (IPCB) 0 (control cabinet)		
LSB1	LIEBHERR-System-Bus 1		
M	Monitor (crane cab)		
1	not assigned		
2	not assigned		
3	Shaft encoder (SE)	Boom direction	25
4	not assigned		
5	not assigned		
6	not assigned		
7	not assigned		
8	not assigned		
9	not assigned		
10	not assigned		
11	not assigned		
12	Inclination sensor (IS)		16


* OPTION
LSB2
LSB-2
EP 1
ZE 1
ZE 2
ZE 3
ZE 0
NT
S:29 SWX.X WG
S:30 SWX.X LG
S:10 SWX.X IA
S:11 SWX.X IA
S:12 SWX.X IA
S:13 SWX.X IA
S:14 SWX.X IA
S:16 SWX.X IA
S:17 SWX.X IA
S:18 SWX.X IA
S:19 SWX.X IA
S:20 SWX.X IA
S:21 SWX.X IA
S:22 SWX.X DK
S:09 SWX.X MS
MS 2
S:08 SWX.X MPG
MS 3
LINKS
RECHTS
-S901
-S902
-S903
-S904
-S905
-S916
-S917
-S912
-S914
-S913
-S915
-S401
-S501
-84
-87
-82

B198610

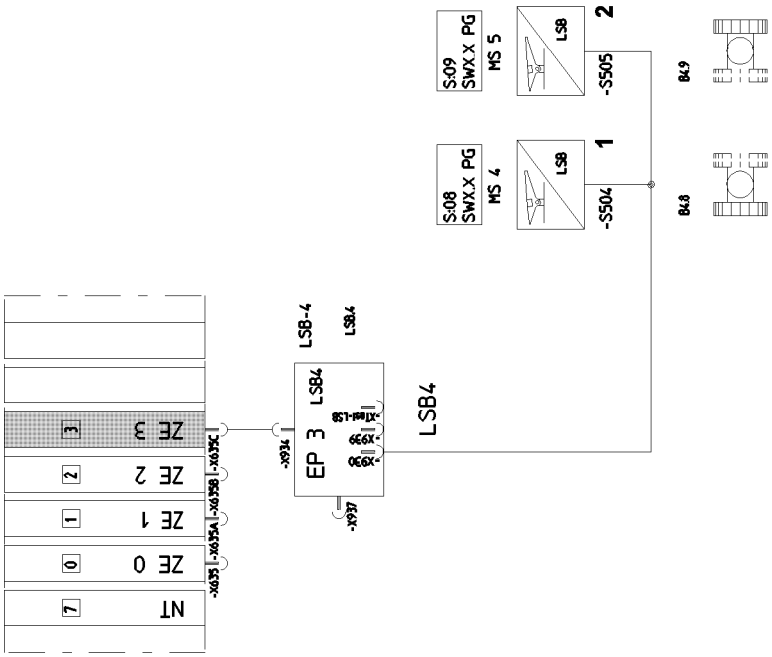
16.2 LSB2 overview

Pos.	Station		Bus address
CPU-1	Central processing unit (CPU) 1 (control cabinet)		1
IPC-B1	Input printed circuit board (IPCB) 1 (control cabinet)		
LSB2	LIEBHERR-System-Bus 2		
1	Inductive sensor (IS)	Tele pinning 1	10
2	Inductive sensor (IS)	Tele pinning 2	11
3	Inductive sensor (IS)	Tele pinning 3	12
4	Inductive sensor (IS)	Tele pinning 4	13
5	Inductive sensor (IS)	Tele pinning 5	14
6	not assigned		
7	Inductive sensor (IS)	Telescopic boom, pinned	16
8	Inductive sensor (IS)	Telescopic boom, unpinned	17
9	Inductive sensor (IS)	Cylinder pinned, left	18
10	Inductive sensor (IS)	Cylinder unpinned, left	19
11	Inductive sensor (IS)	Cylinder pinned, right	20
12	Inductive sensor (IS)	Cylinder unpinned, right	21
13	Pedal sensor (PS) (MS3)		8
14	Master switch 2 (MS2)		9
15	Angle sensor (AS)	Tele pivot section	29
16	Length sensor (LS)	Telescoping cylinder	30
17	Pressure sensor (PS)	Luffing cylinder, piston surface	22


* OPTION
-B1
* 9
S:26 SWX.XHO -S945
DKS (3)
* 12
-X505
-X5564
-X5564W
-X502
-X556
Y-
* ADAPTER
S:27 SWX.XHO -S940
KS (2)
* 10
-X504
-X501
S:29 SWX.X WG -B55 KLAPPSPITZE
11
S:24 SWX.XHO -S931
M (4)
* 8
-X931
S:28 SWX.X HO -S930
T (1)
7
-X451
S:23 SWX.X WG -B6 ROLLENKOPF
6
-X417
-X556V
-X500
LSB3
LSB-3
LSB.3
EP 2
LSB3
-X924
-X929
-X920
-X927
ZE 3
ZE 2
ZE 1
ZE 0
NT
-X635
-X635A
-X635B
-X635C
S:21 SWX.X DK -B12 LS
4
S:20 SWX.X DK -B11 PUMPE
3
S:09 SWX.X MS -S301 MS 1
13
M02-366 SWX.X EA
14
CAN
LSB-A
LSB-B
E/A 6
19
16
18
20
15
21
CAN
CAN
X1
X2
B198685

16.3 LSB3 overview

Pos.	Station		Bus address
CPU-2	Central processing unit (CPU) 2 (control cabinet)		1
IPC-B2	Input printed circuit board (IPCB) 2 (control cabinet)		
LSB3	LIEBHERR-System-Bus 3		
1	not assigned		
2	not assigned		
3	Pressure sensor (PS)	Pump	20
4	Pressure sensor (PS)	LS	21
5	not assigned		
6	Angle sensor (AS)	Pulley head	23
7	Hoist limit switch (HO) 1	Telescopic boom head, right	28
8	Hoist limit switch (HO) 4	Boom nose (second HO Tele left)	24
9	Wind sensor		
10	Hoist limit switch (HO) 2	Single folding jib	27
11	Angle sensor (AS)	Folding jib	29
12	Hoist limit switch (HO) 3	Dual folding jib	26
13	Master switch 1 (MS1)		9
14	Input/output module 6 (IO)	Cooling unit drive, exhaust flaps, ventilation flaps	2
15	Motor ECU		
16	Ventilation flap		
17	not assigned		
18	Cooling unit drive		
19	Exhaust flap		
20	Can-bus star point		
21	Flame starting device		


S:09
SWX.X PG
MS 5
LSB
2
-S505
S:08
SWX.X PG
MS 4
LSB
1
-S504
LSB4
LSB4
LSB4
EP 3
LSB4
ZE 3
ZE 2
ZE 1
ZE 0
NT

B198686

16.4 LSB4 overview

Pos.	Station		Bus address
CPU-3	Central processing unit (CPU) 3 (control cabinet)		1
IPC-B3	Input printed circuit board (IPCB) 3 (control cabinet)		
LSB4	LIEBHERR-System-Bus 4		
1	Pedal sensor (PS) (MS4)		8
2	Pedal sensor (PS) (MS5)		9
3	not assigned		
4	not assigned		
5	not assigned		
6	not assigned		
7	not assigned		
8	not assigned		
9	not assigned		
10	not assigned		

B197077

1 Error identification - LICCON computer system

☞ **Notice!**
Note
! The monitor illustrations in this section are only examples. The error codes shown in the monitor illustrations and the corresponding error descriptions might not exactly match the crane.
! Please note that all illustrations in this chapter are only examples and might not exactly match your crane.

1.1 General

The errors which occur can be classified according to different criteria. The most frequently used description is identification according to the cause of the error.
The LICCON computer system encompasses a very large number of error diagnostics and self-monitoring routines. With some errors, it may therefore not be possible to determine exactly which component is defective.
Example: interrupted data transmission between two components:

– Each of the two components involved (for example, monitor or CPU, power unit or CPU, sensor or CPU) could be defective.
– The transmission circuit between the two (e.g. the monitor cable, module frame, sensor line or actuator line) could be defective.

Except for monitor errors and obvious power unit errors, the errors will therefore not be classified according to the component that may be defective, but rather according to its corporate identity type.
The errors are sequenced in the order that they are checked by the LICCON computer system:

1.) Monitor errors
- indicate an error on the monitor at the start of operations or during operation
- Identification characteristic: a text or an unclear picture on the monitor

2.) Basic module errors
- mostly occur due to errors on parts of the basic module (hardware or software)
  - Basic module errors are subdivided once again into the following sub-error groups:
  - Unique power unit errors
    - indicate a defective power unit when the LICCON computer system is switched on
    - but can also be partially attributed to other causes
  - Initialization errors
    - are identified by special test routines when the LICCON computer system is running up, for example microprocessor errors, hardware errors
    - are displayed on the 7-segment display of the CPU and possibly via a LICCON-Error-Code (LEC) and plain text on the monitor (error determination screen in program “Test system”)
  - System errors
    - are determined shortly after running up or during operation by the operating system of the LICCON computer system
    - system error programs particularly monitor the function of the electronics and data transfer
      - Fatal system errors
        displayed on monitor with the LICCON-Error-Code and on the 7-segment display of the CPU
      - Other system errors
        only displayed on the 7-segment display of the CPU

3.) Application errors
- are determined in the application program (crane operation and telescoping)
- and incorporate a large number of sensor errors

4.) System errors (LEC)
- internal errors in I/O modules, applications, CAN bus errors, LSB errors etc.

5.) Operating errors (LEC)
- are determined due to incorrect operation (keypad unit, support control units, etc.)

☞ **Notice!**
Error displayed in superstructure and chassis

! In the **superstructure**, application errors, system errors and operating errors are indicated in the operating screen and the telescoping screen by an error message (flashing) and an acoustic signal (=beeper, buzzer).

! In the **chassis**, system errors and operating errors are indicated by the warning light **!** flashing on the display unit. Via the **i-key** on the keypad unit, the LICCON-Error-Code will be displayed on the 7-segment displays **!** of the display unit for the duration of operation.

1.1.1 Locating and rectifying errors

The crane operator can identify any errors that may have occurred using error diagnostics. Together with the error description in the separate error list or the documentation of the error in the program “Test system”, the error can in many cases be quickly located and rectified.

- If the LICCON-Error-Code displays an error:
  Consult the section “Error determination in the LICCON Test system” or the section “Separate error list”
- If the monitor display is defective:
  Consult the section “Monitor errors”
- If the operating display is not displayed or disappears suddenly:
  Consult the section “Basic module errors”.

Caution!
Danger of damage!
! If the crane operator cannot rectify the error himself: Consult LIEBHERR customer service.

If the assistance of LIEBHERR customer service is required, please always provide the following information:
– crane type
– crane number
– full error number and any text provided on the monitor relating to the error
– in the case of basic module errors: also provide 7-segment displays from power unit and CPUs
– conditions of use of crane
– action during which the error occurs
– frequency of error

- If the crane operator cannot rectify the error himself:
  Consult LIEBHERR customer service.

1.1.2 LICCON-Error-Code (LEC)

The LICCON-Error-Code describes four possible error classes:
– System errors
– Operating errors
– Application errors inc. error number
– Basic module errors (fatal system errors)

The error code will be displayed in both the chassis (display unit) and the superstructure (error determination display in the LICCON test system). In addition, all errors are listed in a separate error list (error text, cause, remedy).
The structure of the error code is based primarily on a 6 digit error number as well as the given error class description.

Error code: ±X. 12 34 56	
Element	**Description**
±	Active / inactive error
X.	Error class “B” / “E” (system error, application error, operating error)
12	Device (module generating the error)

Error code: ±X. 12 34 56	
Element	**Description**
34	Error path (source of error)
56	Type of error

There are different error classes:

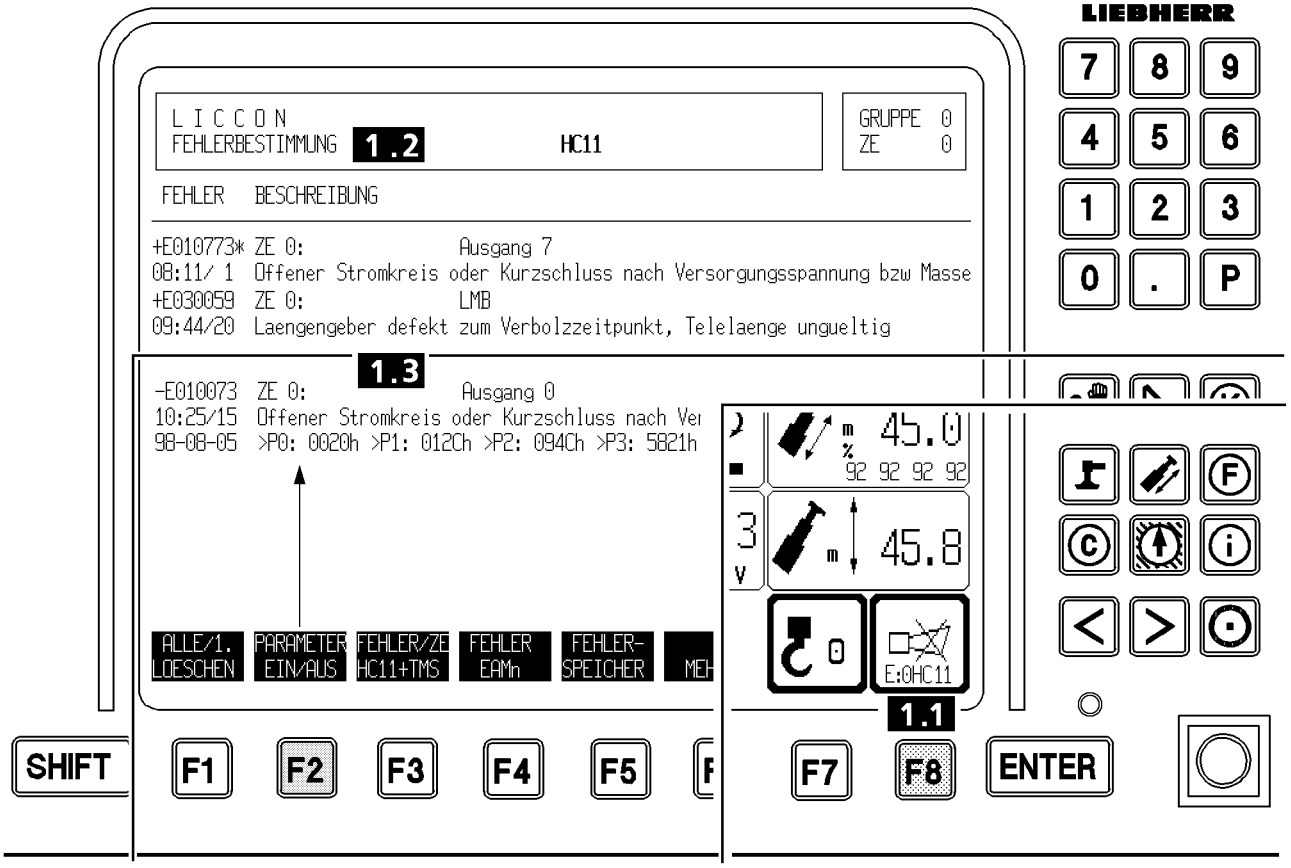
– Operating errors “B”:
  Error due to incorrect operation (keypad, ignition starter switch ...)
  for example **B. 4 9 9 8 9 8**
– System errors “E”:
  Persistent errors, or briefly occurring errors (engine error, transmission error, module error ....)
  for example **E . 8 1 3 0 2 3**
– Application errors “E”:
  Errors when operating crane (retrofitting under load, hoist limit switch ....)
  for example **E. 0 3 0 0 5 9**
– Basic module errors “E”:
  Errors in an electronic basic module (fatal system error)
  E. 0 0 0 0 5 1

Caution!
Deleting errors in the error vault!
When the ignition is switched off, all error messages (active and inactive) are deleted in the error vaults.

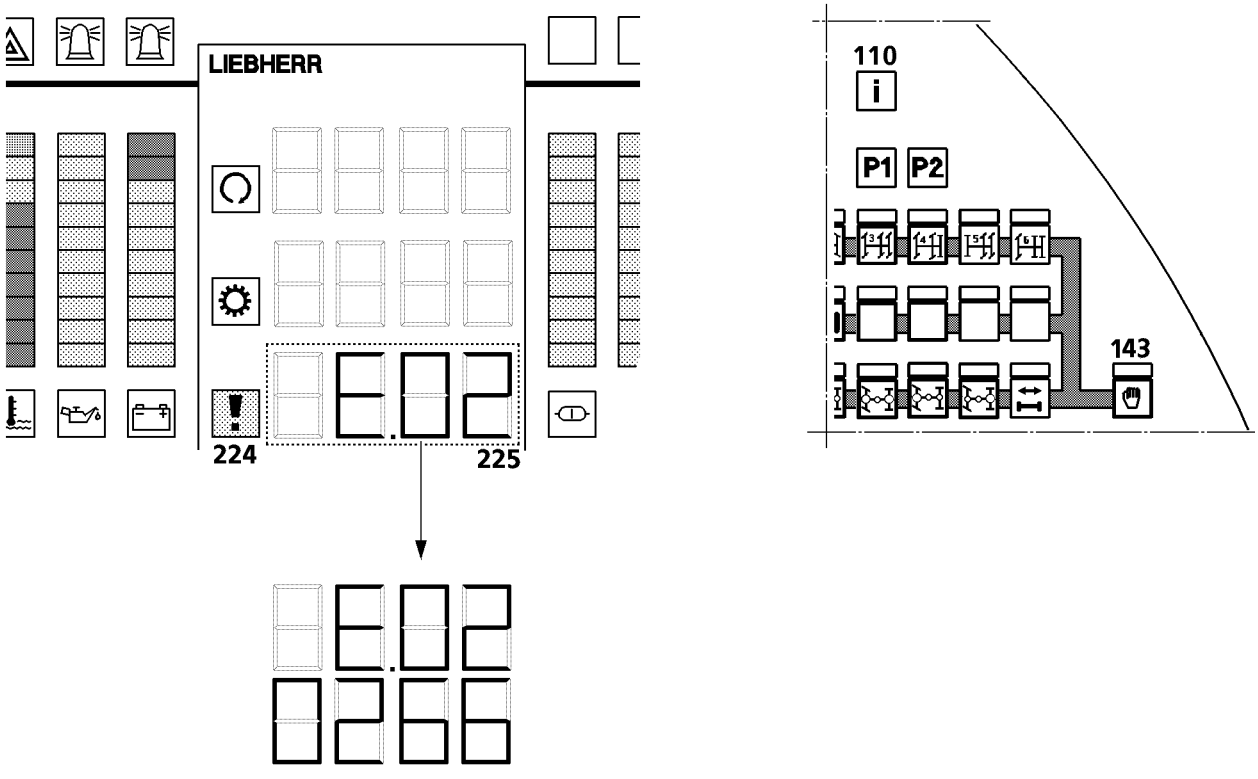
! Be careful when switching off the ignition.

blank page!

1 OW



2 UW



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1.1.3 Displaying errors in the superstructure

If there is a system error, application error or operating error, an error message **1.1** will appear in the program “Crane operation”, “Telescoping” or “Support” in the symbol element “Horn” on the LICCON monitor.
The error will be displayed by:
– the error class “E” =system error / application error or “B” =operating error
– the relevant CPU
– the processors of the CPU (TMS or HC11) or the relevant I/O module

Example, system error (illustration **1.1**):

Error code: E:OHC11	
Element	**Description**
E:	Error class
0	CPU
HC11	I/O module and number, or processor of CPU

Caution!
Danger of equipment damage!
! In the case of fatal system errors, please also note the 7-segment displays on the CPUs.

- Press function key **F8** once.

Result: Horn is switched off.

- Press function key **F8** twice.

Result: Change to Error determination display **1.2** in program “Test system”.
The page of the error vault on which the error is stored appears. The error is displayed as a 6 digit LEC and documented. Active errors are identified by a “+”.

Inactive errors can be displayed using function key **F2** in subprogram “PARAMETER ON” **1.3**. Identification in this case is “-”. You can find more information on inactive errors in the section “System errors”, “Superstructure”.

- If inactive errors are to be displayed:
  Press function key **F2**.

1.1.4 Displaying errors in the chassis

If there is a system error “E”, the warning light **224** on the display unit flashes. Via the **i** -key **110** on the keypad unit, the LICCON-Error-Code (LEC) on the display unit **225** will be alternatingly displayed for the duration of the operation.
This means that the entire LEC will be alternately displayed by:
– the error class “E” =system error / application error or “b” =operating error
– the 6-digit error number

Example, system error (active error - illustration **1.1**):

Error code: E. 02 0266	
Element	**Description**
-	Active / inactive error (exc. active error sign)
E.	Error class (system error)
02 0266	Error number

If an operating error is caused while a system error is present the warning light **224** illuminates. The operating error “b” appears automatically on the display unit **225**.

- If several active errors are present at the same time:
  Press the **i** -key **110** again.

Result: All existing active errors will be displayed.
Once all existing errors have been displayed “End.” appears on the display unit **225**. By pressing the **i** -key **110** again, the first error will be displayed once more.

Inactive errors can be displayed by pressing the hand key **143** and the **i** -key **110** on the display unit **225** at the same time. Identification in this case is “-”. You can find more information on inactive errors in the section “System errors”, “Chassis”.

- If inactive errors are to be displayed:
  Press the hand key **143** and the **i** -key **110** simultaneously.

1.1.5 Separate error list

The errors are listed in the separate error list. Error class “C” and error priority “P” are given in the last two columns of the error list.

Error no.	**generated text / cause / remedy**	**Plug**	**Sheet**	**C**	**P**
121351	CPU 1: LSBA station 13 was not... Entry of error in error memory or... Configuration problem, load new software.	X919:4		E	2
121353	CPU 1: LSBA station 13 no longer answering... Entry of error in error memory, station... Check connection, if connection OK then	X919:4		E	1
121354	... ...	...		.	.

Plug=plug description of component
Sheet=page in electrical circuit diagram
C=error class
P=error priority

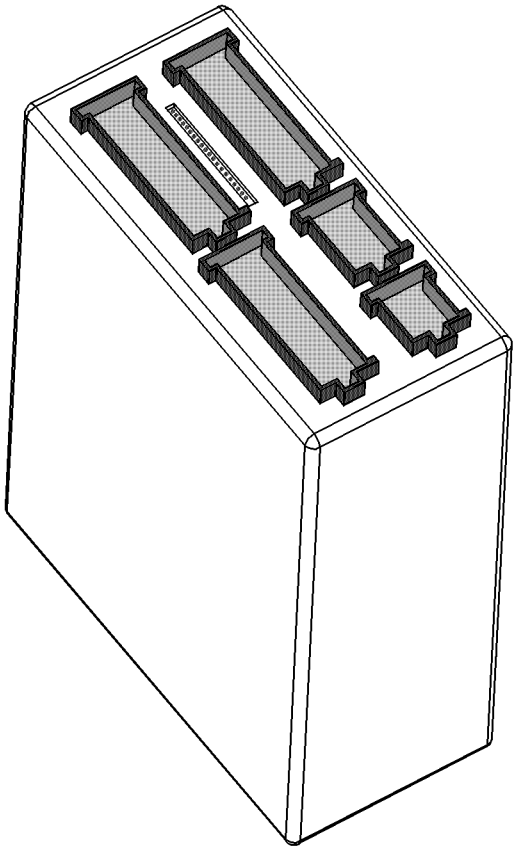
A differentiation is made between two error classes:

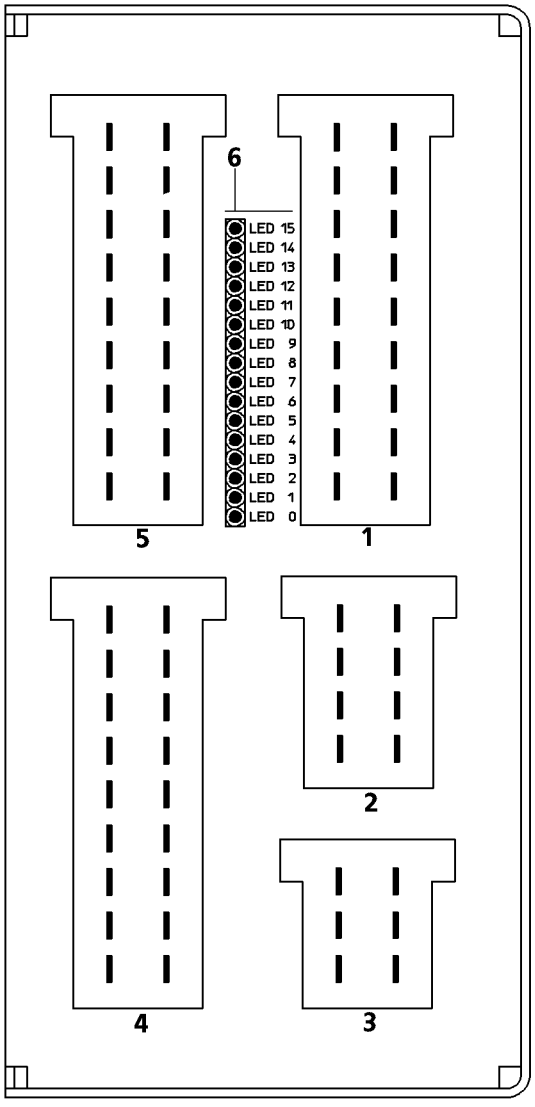
Error class	Meaning
B	Operating errors
E	System errors Application errors Basic module errors (fatal system error(s))

A differentiation is made between 3 error priorities:

Error priority	Meaning
0	tolerable error
1	rectify error immediately
2	Switch off device immediately!

☞ **Notice!**
Error priority for operating errors.
! For operating errors, error priority is **not** relevant.




6
LED 15
LED 14
LED 13
LED 12
LED 11
LED 10
LED 9
LED 8
LED 7
LED 6
LED 5
LED 4
LED 3
LED 2
LED 1
LED 0
5
1
2
4
3

B197881

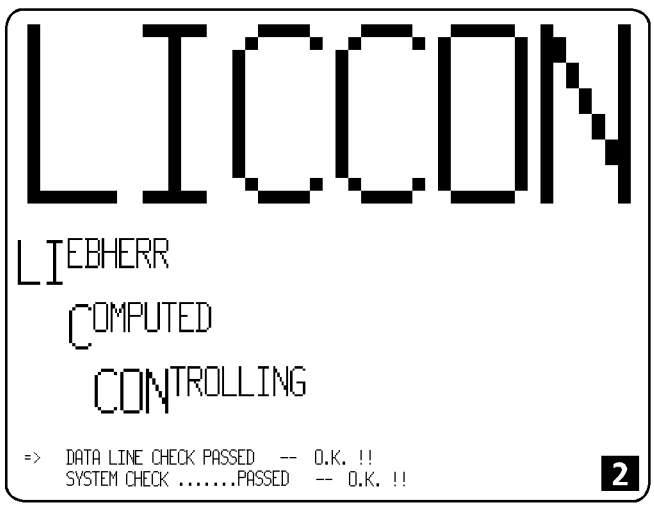
1.1.6 LED error code and status display on I/O modules

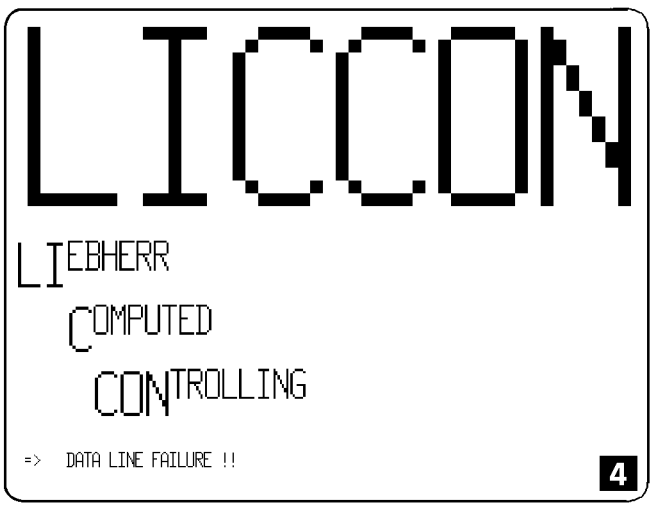
Inputs and constant current sources **1**
SPI bus **2**
CAN bus **3**
Voltage supply **4**
Inputs, outputs, LSB bus **5**

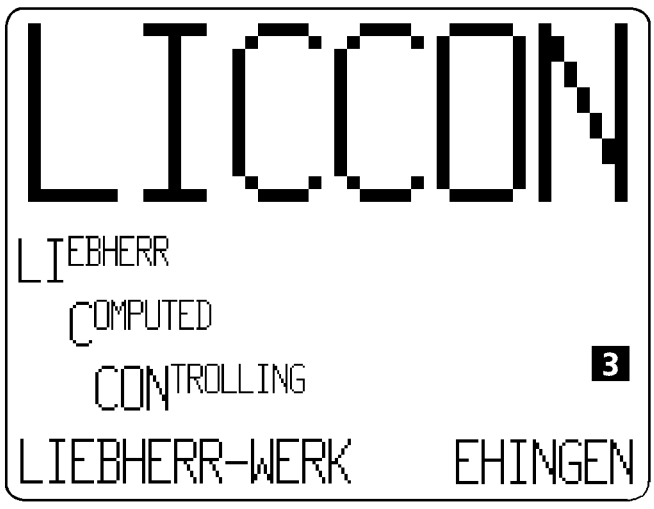
LED	Colour	Module	Error / status	Meaning	
				static	**flashing**
15	red	HW watchdog	Error	no error (LED 50% bright) Operating status	intermittent error
14	red	HW error	Error	change I/O module	-
13	yellow	HW error	Status	output range defective	-
12	yellow	HW error	Status	initialization[1]	-
11	yellow	HW error	Status	Appl.-/driver watchdog	Illegal Interrupt
10	green	-	-	-	-
9	green	-	-	-	-
8	green	-	-	-	-
7	red	LSB1 driver	Error	persistent error on LSB1	intermittent interruption on LSB1
6	yellow	LSB1 driver	Status	LSB 1 bus off	download via LSB1
5	red	LSB2 driver	Error	persistent error on LSB2	intermittent interruption on LSB2
4	yellow	LSB2 driver	Status	LSB2 bus off	download via LSB2
3	red	CAN driver	Error	persistent error on CAN	intermittent interruption on CAN
2	yellow	CAN driver	Status	all stations missing on CAN	one/more stations missing on CAN
1	red	SSC driver	Error	persistent error on SSC	intermittent interruption on SSC
0	yellow	SSC driver	Status	-	-

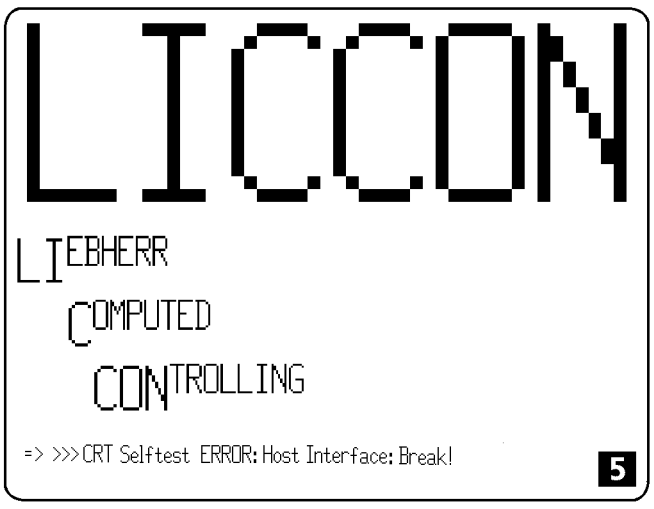
[1] Error with: register, RAM, ROM, output stage watchdog, firmware, crane configuration file


LIEBHERR
7 8 9
4 5 6
1 2 3
0 . P
LICCON
LIEBHERR
COMPUTED
CONTROLLING
=> DATA LINE CHECK PASSED -- O.K. !!
SYSTEM CHECK .....
1
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER


LICCON
LIEBHERR
COMPUTED
CONTROLLING
=> DATA LINE CHECK PASSED -- O.K. !!
SYSTEM CHECK .....PASSED -- O.K. !!
2


LICCON
LIEBHERR
COMPUTED
CONTROLLING
=> DATA LINE FAILURE !!
4


LICCON
LIEBHERR
COMPUTED
CONTROLLING
3
LIEBHERR-WERK EHINGEN


LICCON
LIEBHERR
COMPUTED
CONTROLLING
=> >>>CRT Selftest ERROR: Host Interface: Break!
5

B197882

1.2 Monitor errors

Monitor errors:
– could indicate a defective monitor when switching on control system
– could stem from errors in the basic module
– could stem from a shortage in monitor supply voltage (the monitor stays dark in these cases)

The light-emitting diode (LED) **I**, which is located on the right at the bottom of the monitor will indicate whether the monitor's voltage supply (24 V) is present.
The run-up must progress as shown in illustration **1** to illustration **3**. When switching on the LICCON computer system, the connection from the monitor to the central processing unit (CPU) is tested first.
If the connection is OK, the monitor displays:

```
=>  DATA LINE CHECK PASSED  --  O.K. !!
    SYSTEM CHECK .......
```

If the connection is defective, the monitor displays:

```
=>  DATA LINE FAILURE !!
```

or

```
=> >>>  CRT Selftest ERROR: Host Interface: Break!
```

1.2.1 Locating and rectifying monitor errors

The following index shows possible monitor errors, their possible causes and possible methods of rectifying them.
The monitor errors are presented in the order that the crane operator or the LICCON computer system identifies them.
Rectify the errors in the sequence given as follows.

Error	Possible causes
Monitor remains dark when switching on - LED I does **not** illuminate	No power supply
	Overload cut-out is switched off

Possible remedy for error (maintain error rectification sequence):

- Check the power supply.
- Operate the overload cut-out for monitors.

Error	Possible causes
Monitor has no picture	Monitor has switched off the picture at temperatures of <-20°C and >70°C
	Supply line to monitor is unplugged or defective
	Monitor is defective

Possible remedy for error (maintain error rectification sequence):

- Heat or cool the cab.
- Replace the defective LICCON monitor by a functioning replacement monitor (see section “Replacing the monitor”).
- Check the supply voltage (V) on the monitor connection plug (setpoint: 18 - 36V, nominal: 24V).

blank page!


LIEBHERR
LICCON
LIEBHERR
COMPUTED
CONTROLLING
=> DATA LINE FAILURE !!
4
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

B197883

Error	Possible causes
When switching on, monitor displays error text from illustration 4 - LED **I** does **not** illuminate.	monitor defective
	Monitor to CPU connection (via IPCB) has no power supply
	CPU defective

Possible remedy for error (maintain error rectification sequence):

- Open the control cabinet and check the CPU display.

If the CPU display

is shown

flashing:

- Check the connection of the CPU to the input PCB and the connection of the input PCB to the monitor for interruption.
- If the connections are OK:
  Check the CPU of the monitor and error display and replace if necessary.
- If this flashing display is **not** shown on the CPU display after switching on:
  Check the CPU or program memory card and replace if necessary (see section “Locating basic module errors”, “Checking the CPU”).
- Replace the defective LICCON monitor with a functioning replacement monitor.


LIEBHERR
LICCON
LIEBHERR
COMPUTED
CONTROLLING
=> >>> CRT Selftest ERROR: Host Interface: Break!
5
7 8 9
4 5 6
1 2 3
0 . P
K
F
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

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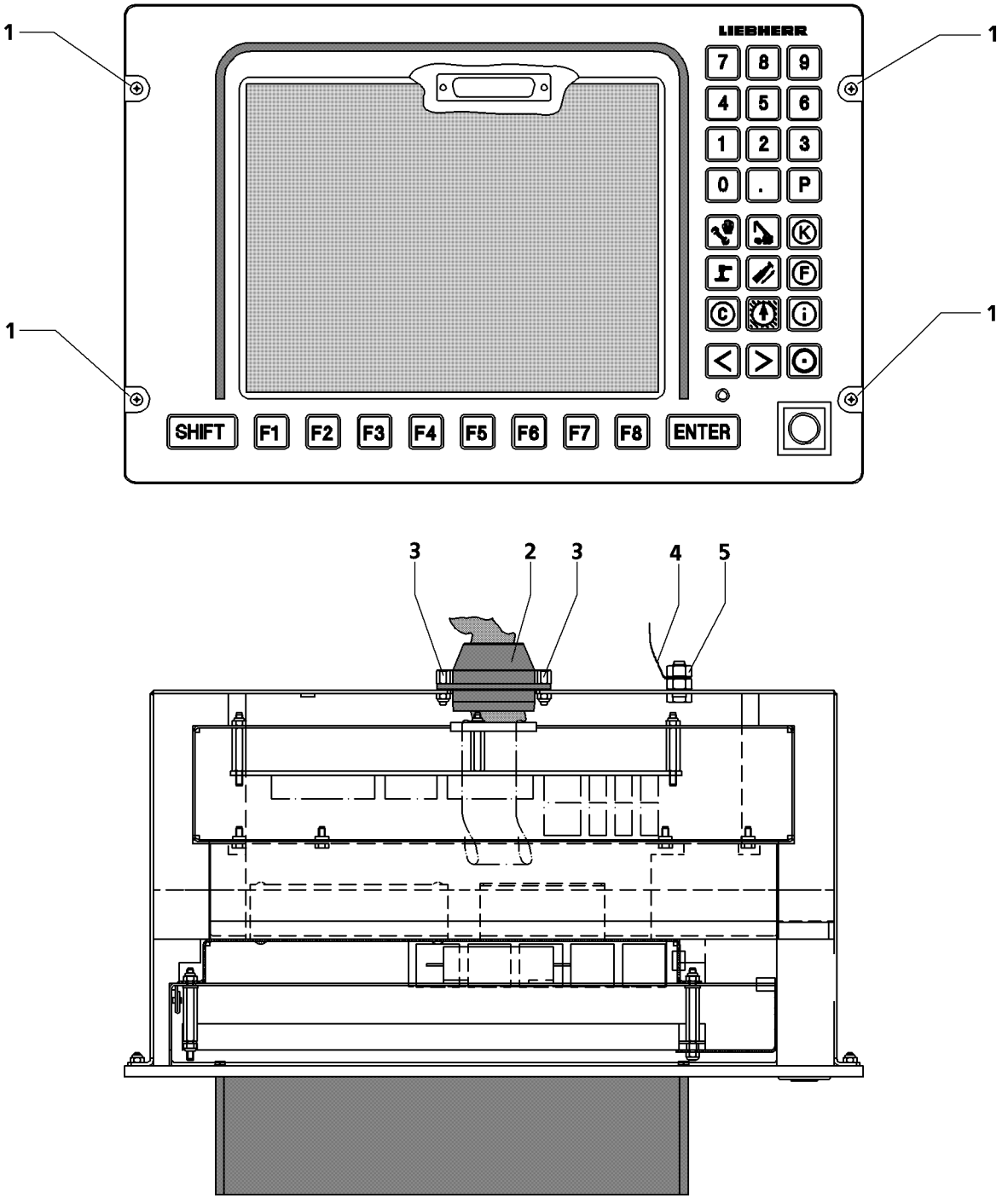
Error	Possible causes
When switching on, monitor displays error text from illustration 5	monitor defective
	connection defective
	power unit defective
	CPU defective

Possible remedy for error (maintain error rectification sequence):

- Replace the faulty monitor with a functioning replacement monitor.
- If the replacement monitor displays the same error message:
  Open the control cabinet and test the power unit.
- If the power unit display does **not** display “7” when switched on:
  see section “Basic module errors”, “Unique power unit errors”
- If the power unit display displays “7” after switching on:
  Power unit is OK. Check the connection from the CPU to the input PCB and the connection from the input PCB to the monitor for interruption.
- If the connections are OK:
  Check CPU0.

Error	Possible causes
When switching on, monitor displays one of the following errors: Monitor horn does not work Sealed keypad defective Brightness control defective Key switch defective Symbol elements incorrect or missing	Individual monitor parts (display, keypad, key switch) defective

- Replace the faulty monitor with a functioning replacement monitor.


1
1
1
1
LIEBHERR
7
8
9
4
5
6
1
2
3
0
.
P
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER
3
2
3
4
5

B197885

1.2.2 Replacing the monitor

1.2.3 Dismounting the monitor

The monitor can easily be replaced using simple tools.

Danger!
Danger of fatal injury when operating crane without monitor display.
! Replace the defective LICCON monitor.

- Switch off the crane's engine.
- Unscrew the mounting screws **1** in the front plate on the monitor.
- Take out the monitor.
- On the monitor connection cable **2**, unscrew the bolt connections **3** and unplug the connector **2**.
- Unscrew screw **5** and release the ground lead **4** of the monitor.

1.2.4 Fitting the replacement monitor

- Tighten the ground lead **4** of the monitor and screw the screw **5** tight.
- Plug in the connector **2** on the monitor connection cable **2** and screw the bolt connections **3** tight.
- Place the monitor in the instrument panel.
- Screw the mounting screws **1** in the front plate on the monitor tight.

1.3 Basic module errors

Basic module errors are errors that are usually caused by errors in parts of the basic module (hardware).
Basic module errors are divided into the following sub-error groups:
1.) Unique power unit errors
2.) Initialization errors
3.) System errors (other system errors)

Notice!
LIEBHERR customer service information
! Even if the crane can be repaired without external assistance, please inform LIEBHERR customer service precisely about the error display shown in the case of each basic module error (unique power unit errors, initialization errors or system errors).

Notice!
Causes of errors and methods of error rectification in the charts
! Regrettably, the possible causes of errors and methods of error rectification given in the charts cannot be complete due to the complexity of the system. They are designed to provide information which can be used to repair the crane without external assistance in straightforward cases.

1.3.1 Unique power unit errors

Externally, the power unit looks very similar to the CPUs. However, the power unit is always inserted on the extreme left. During normal operation, the 7-segment display on the power unit shows the displays from the following chart.

Power unit display during normal operation		
Power unit display	**Type of display**	**Meaning**
	static	Control is off Battery power is present at the basic module, stand-by power supply for memory (CPU RAMs and COMMON RAMs) is present **Note:** Must also illuminate when ignition is off.
	static	Control is on Battery power present at basic module, power unit is OK
	static	Control is on Battery power present at basic module, power unit is OK This means that all CPUs receive this signal and display “P” as confirmation on their displays. If this switching forward is not working: After restarting the program, the LMB with the smallest load chart and zero reeving will be displayed on the LICCON monitor.

Power unit errors:
– indicate a defective power unit when the LICCON computer system is switched on
– but can also be attributed to other causes

Power unit errors can only be observed when switching on or operating by looking at the power unit display when the control cabinet is open.
The following chart describes possible power unit errors.
Rectify the errors in the sequence given as follows.

☞ **Notice!**
Remedying basic module errors
! The section “Locating basic module errors” describes the identification of basic module errors in detail and provides a systematic procedure for remedying them. Testing and replacing the power unit is also described there.

Unique power unit error			
Power unit display	**Type of display**	**Error description and error text**	**Possible causes of error**
	static	Error ANZ7_E	error not tolerable

Possible remedy for error (maintain error rectification sequence):

- If possible:
  When switching on next, note error entry in CW7.104 - CW7.177.
- Inform LIEBHERR customer service.
- If the error continues to occur after switching on several times:
  Replace power unit.

Unique power unit error			
Power unit display	**Type of display**	**Error description and error text**	**Possible causes of error**
	static	Over/undervoltage ERROR_VOLTAGE	controller defective

Possible remedy for error (maintain error rectification sequence):

- Check supply voltage and replace power unit if necessary.

Unique power unit error			
Power unit display	**Type of display**	**Error description and error text**	**Possible causes of error**
	-	no U-BATT	no battery power

Possible remedy for error:

- Check supply voltage and replace power unit if necessary.

Warning lights flashing			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	Timeout PIC-Watchdog	PIC defective	**Note:** If the error continues to occur after switching on several times: **Replace power unit**

Warning lights flashing			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	PIC-Error 1	start/stop bit missing	**Note:** If the error continues to occur after switching on several times: **Replace power unit**

Warning lights flashing			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	PIC-Error 2	optocoupler defective	Replace power unit as soon as possible, inform **LIEBHERR** customer service.

Warning lights flashing			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	PIC-Error 3	under/overvoltage or HC11 watchdog	**Note:** If the error continues to occur after switching on several times: **Replace power unit**

Warning lights flashing			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	Timeout Load LCA	CPU0 missing	Check whether CPU0 is present. Check connection CPU, bus PCB, power unit. **Note:** Maintain error rectification sequence!

Warning lights flashing			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	CRC-Error	Memory error	Replace power unit.

Warning lights flashing			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	inadmissible mode	defective cabling D+, 15, control ON, ..	Check cabling.

Warning lights flashing			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	common memory missing	insert card missing	Insert card.

Warning lights flashing			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	Warning	see error entry in CW7.104 - CW7.111	See description, error entry in CW7.104 - CW7.111.

Warning lights flashing			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
		Test operation (protocol mode)	Switch off test operation. **Note:** The actual error number is shown after the letter “**F** ”

Error during software update			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	FLASH defective	FLASH module defective	Remove upload card and insert original insert card. Replace power unit if necessary. **Note:** Maintain error rectification sequence!

Error during software update			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	FLASH not clear	FLASH module defective	See power unit display F5.

Error during software update			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	FLASH Timeout Polling	FLASH module defective	See power unit display F5.

Error during software update			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	FLASH Timeout Erase	FLASH module defective	See power unit display F5.

Error during software update			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	insert card defective	incorrect insert card	See power unit display F5.

Error during software update			
Power unit display	**Error text**	**Possible causes of error**	**Possible remedy for error**
	inadmissible error number	internal error	See power unit display F5. **Note:** For further power unit errors see error entry in CW7.104 – CW7.111

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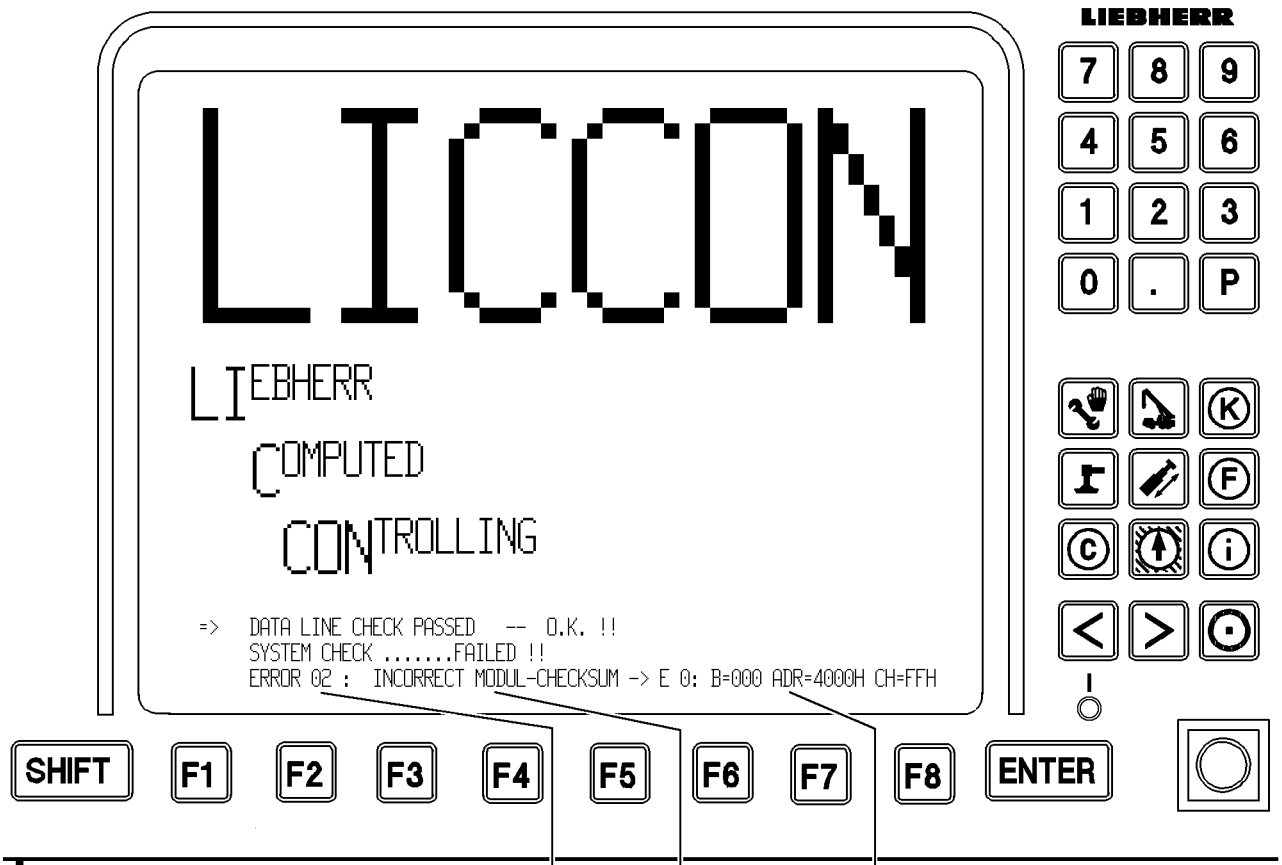
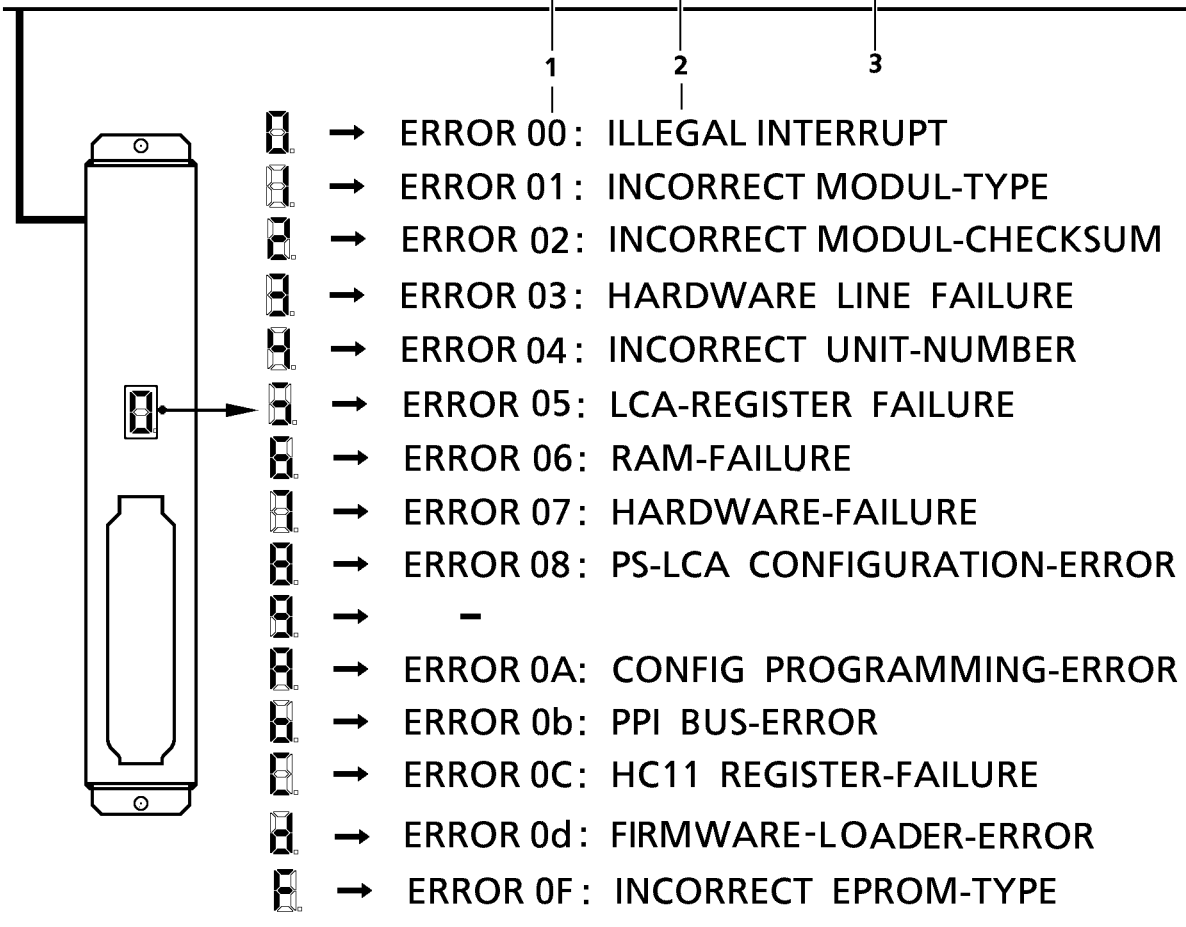

LIEBHERR
7 8 9
4 5 6
1 2 3
0 . P
LICCON
LIEBHERR
COMPUTED
CONTROLLING
=> DATA LINE CHECK PASSED -- O.K. !!
SYSTEM CHECK .....FAILED !!
ERROR 02 : INCORRECT MODUL-CHECKSUM -> E 0: B=000 ADR=4000H CH=FFH
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER


1
2
3
→ ERROR 00: ILLEGAL INTERRUPT
→ ERROR 01: INCORRECT MODUL-TYPE
→ ERROR 02: INCORRECT MODUL-CHECKSUM
→ ERROR 03: HARDWARE LINE FAILURE
→ ERROR 04: INCORRECT UNIT-NUMBER
→ ERROR 05: LCA-REGISTER FAILURE
→ ERROR 06: RAM-FAILURE
→ ERROR 07: HARDWARE-FAILURE
→ ERROR 08: PS-LCA CONFIGURATION-ERROR
→ -
→ ERROR 0A: CONFIG PROGRAMMING-ERROR
→ ERROR 0b: PPI BUS-ERROR
→ ERROR 0C: HC11 REGISTER-FAILURE
→ ERROR 0d: FIRMWARE-LOADER-ERROR
→ ERROR 0F: INCORRECT EPROM-TYPE

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1.3.2 Initialization errors

Initialization errors are hardware errors which are determined during run-up and automatic check by special test routines of the LICCON computer system. They are displayed by a **flashing** initialization error sign (number or sign) on the 7-segment display of the CPU.
The initialization error is always located with the assistance of the CPU display. Possible initialization error signs and information about the possible causes of error and possible remedies for the errors are listed in the following chart. The crane operator must always open the control cabinet and observe the CPU displays in the event of initialization errors and system errors.

☞ **Notice!**
Remedying basic module errors
! The exact procedure for remedying basic module errors is described in the section “Locating basic module errors”.

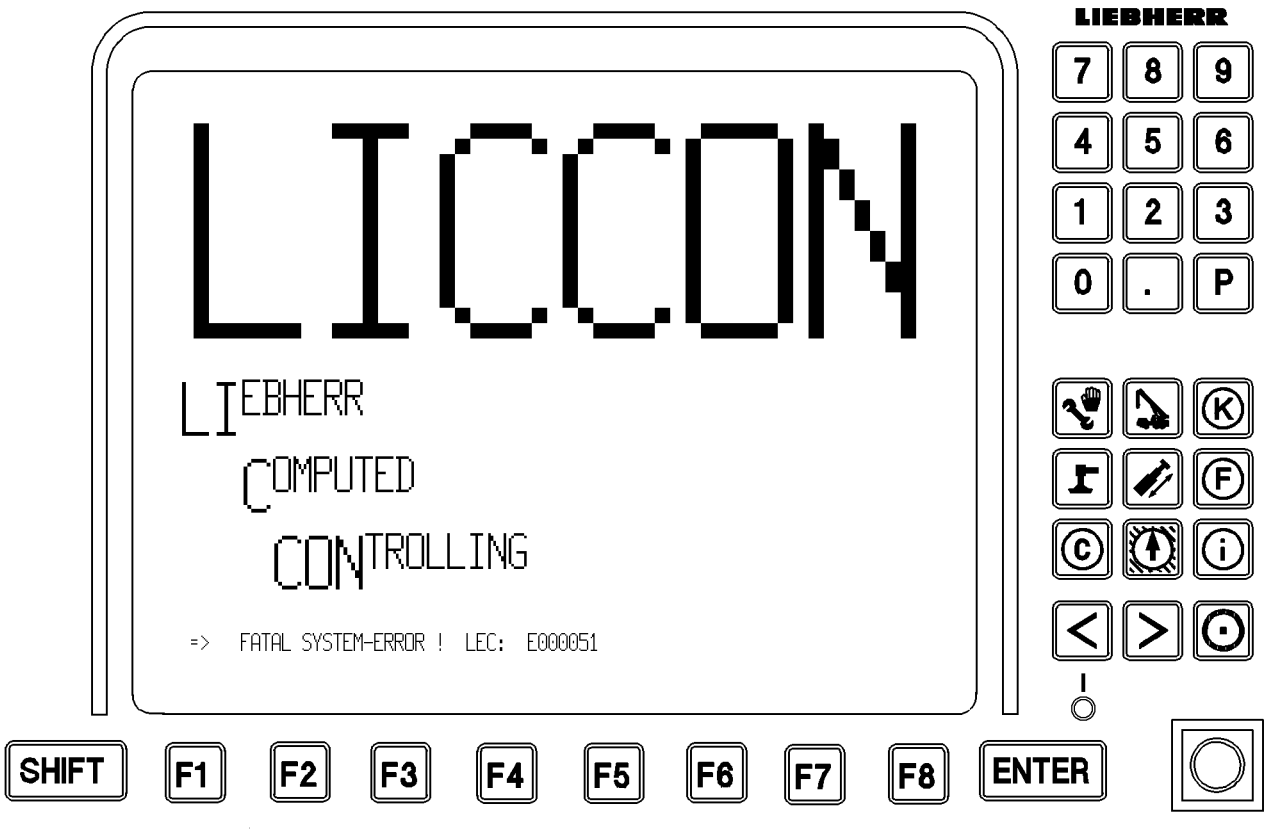
- If an initialization error occurs on a CPU to which **a monitor** is connected:
  The error will (if time permits) be displayed additionally on the monitor.

Result: Display:
1.) Error number (=initialization error number) corresponds to CPU display
2.) Error description text
3.) Partially further information in form of values of relevant memory cells

- If an initialization error occurs on a CPU to which **no monitor** is connected:
  The error will at first not be visible on the monitor.

Result: The LICCON computer system continues to run briefly.
At this point, however, the initialization error generates a system error as a subsequent error which stops the execution of the program and is displayed on the monitor (see “System errors”).

- If a **hardware error** occurs during operation:
  System error will be displayed and the monitor display freezes or becomes dark (see “System errors”).


LIEBHERR
LICCON
LIEBHERR
COMPUTED
CONTROLLING
=> FATAL SYSTEM-ERROR ! LEC: E000051
7
8
9
4
5
6
1
2
3
0
.
P
K
F
C
i
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

B197887

1.3.3 System errors (basic module errors)

Warning!
Crane functions interrupted in the event of system error.
If a system error occurs:
! All control programs and therefore all crane functions will be interrupted.

Notice!
LIEBHERR customer service information
! Even if the crane can be repaired without external assistance, please inform LIEBHERR customer service precisely about the error display shown in the case of each error.

Errors in the electronic basic module which are identified by the system shortly after run-up of the LICCON computer system or when operating. These programs monitor in particular the function of the program execution and the data transfer. System errors can be subsequent errors which could only be determined during initialization.
If a system error does not occur as the subsequent error of an initialization error, the hardware is probably OK.
To a large extent, system errors have to be rectified by trained LIEBHERR customer service personnel. However, these instructions also provide information on how the crane can be repaired by testing or replacing components of the LICCON computer system.
System errors are always located using the CPU display and error determination in the program “Test system”. In the case of initialization errors and system errors, the CPU display must always be observed, see the section “Locating basic module errors”.
System errors are grouped into:

1.) Fatal system errors (FATAL SYSTEM-ERROR):
Displayed on monitor and CPU
2.) Other system error numbers:
Displayed on the CPU display unit

1.3.4 Fatal system errors (basic module errors)

Fatal system errors are displayed on the monitor with the LICCON-Error-Code (LEC).

The display **FATAL SYSTEM-ERROR !** appears on the monitor together with the relevant LICCON-Error-Code **LEC: Exxxxxx**

Notice!
CPU display!
The CPU displays that control brightness are switched off approx. every 10 milliseconds for a further 10 milliseconds.
! After the system-stop of a system error, there is a 50% likelihood of the display of a subsequent error being displayed on other CPU displays.
! There is a 50 % likelihood that this display will go out.

At the same time, one of the following CPU displays will appear on the CPU which first identifies the error:

System errors			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	static	FATAL SYSTEM-ERROR has occurred (CPU not 0)	error will be displayed on monitor

Possible remedy for error:

- see error description, test system

System errors			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	static	FATAL SYSTEM-ERROR has occurred and global reset (CPU=0)	error will be displayed on monitor

Possible remedy for error:

- see error description, test system

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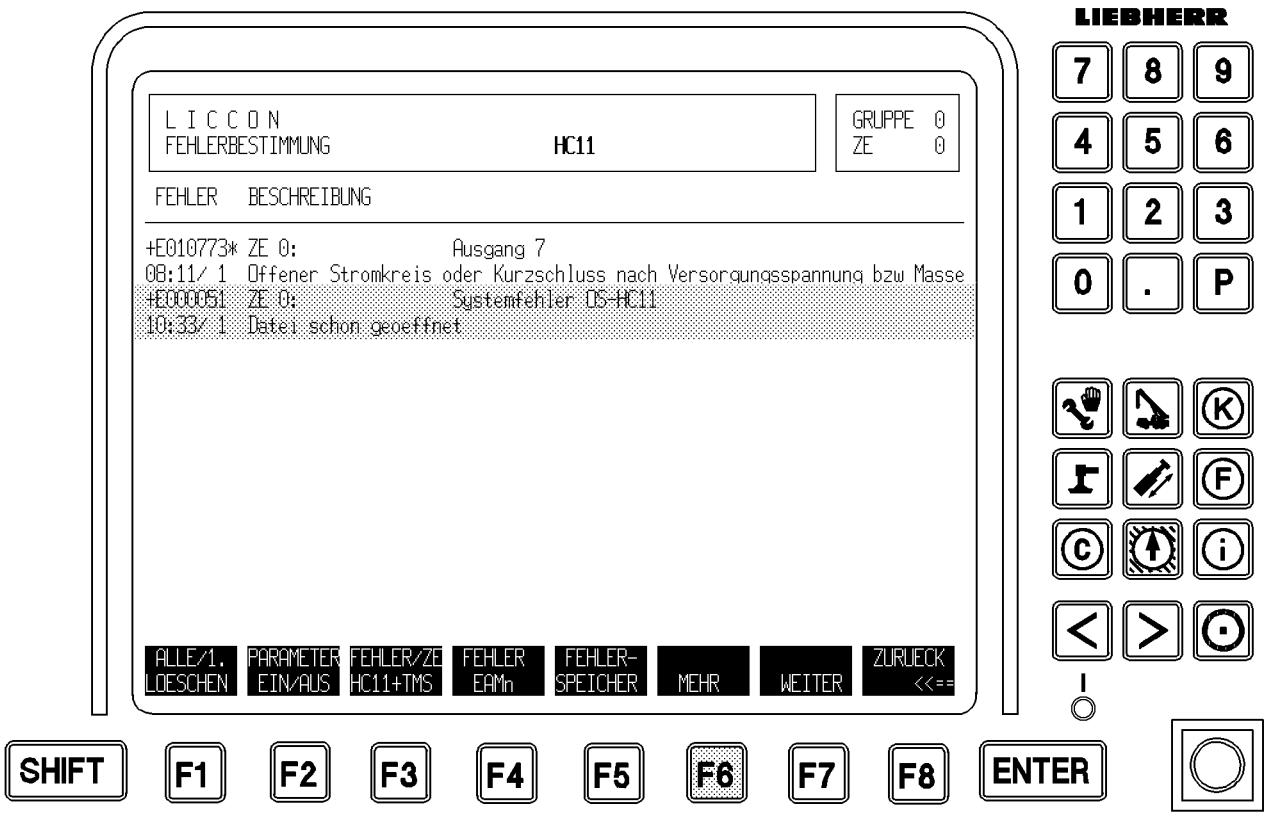
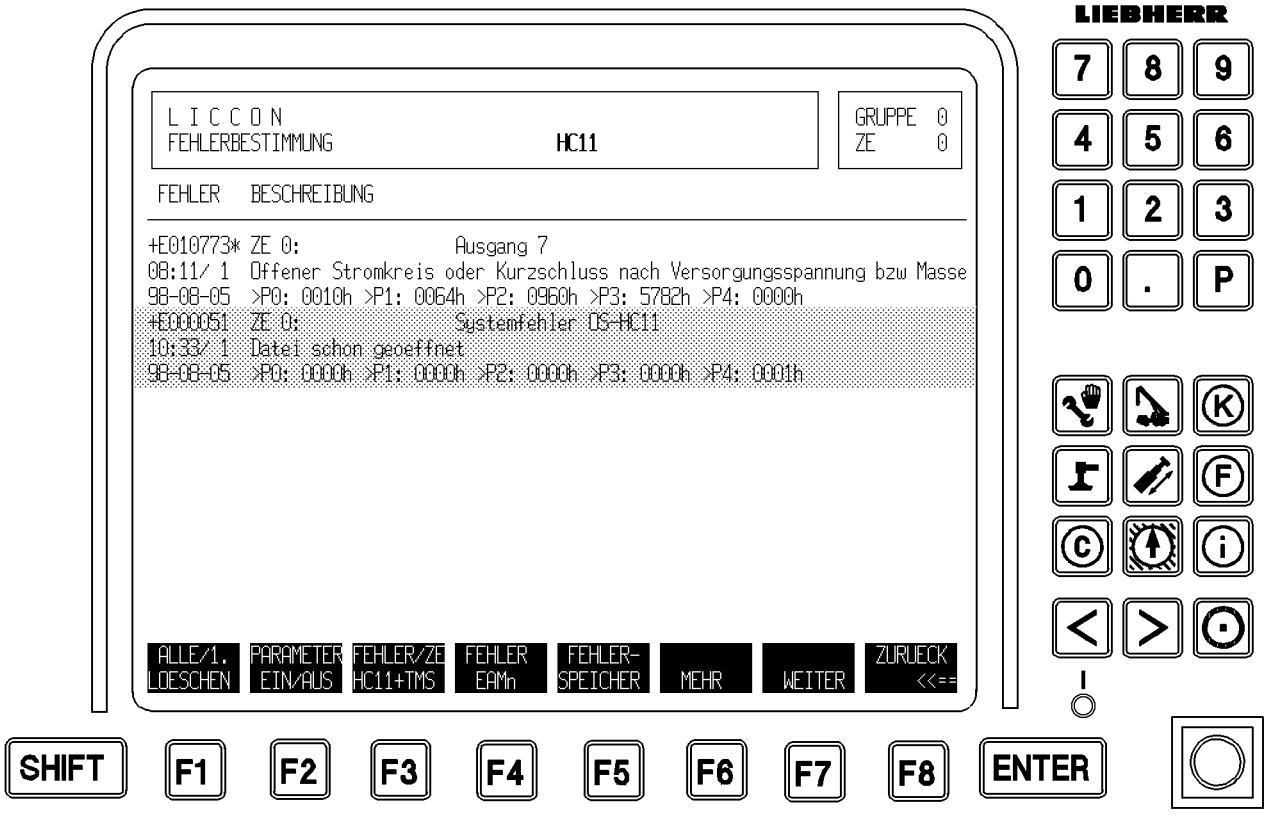

LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
HC11
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG
+E010773* ZE 0: Ausgang 7
08:11/ 1 Offener Stromkreis oder Kurzschluss nach Versorgungsspannung bzw Masse
+E000051 ZE 0: Systemfehler OS-HC11
10:33/ 1 Datei schon geoeffnet
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER-SPEICHER
MEHR
WEITER
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER


LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
HC11
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG
+E010773* ZE 0: Ausgang 7
08:11/ 1 Offener Stromkreis oder Kurzschluss nach Versorgungsspannung bzw Masse
98-08-05 >P0: 0010h >P1: 0064h >P2: 0960h >P3: 5782h >P4: 0000h
+E000051 ZE 0: Systemfehler OS-HC11
10:33/ 1 Datei schon geoeffnet
98-08-05 >P0: 0000h >P1: 0000h >P2: 0000h >P3: 0000h >P4: 0001h
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER-SPEICHER
MEHR
WEITER
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

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To change to the program “Test system” proceed as follows:

- Switch off LICCON computer system.
- Switch LICCON computer system back on after approx. 5 seconds.

Result: The subprogram “Error determination” of the LICCON test system will automatically appear (see illustration above). The system error will be documented there with a 6-digit number.

- Press key **F2**.

Result: Call-up of subprogram “PARAMETER ON/OFF”. Error-specific data as well as the date the error occurred can be read off (see illustration below).

- Press key **F6**.

Result: Call-up of subprogram “MORE”. Other errors from the error vault can be read off.

It is not possible to change back to other LICCON programs directly via the program keys.

- Switch off LICCON computer system.
- Switch LICCON computer system back on after approx. 5 seconds.

1.3.5 Other system errors (basic module errors)

Other system errors are only differentiated from fatal system errors in that no monitor error display appears. The monitor can no longer be described by the type of error for these system errors. Corporate identity of other system errors on the monitor are e.g.:

– the monitor display freezes
– the monitor display goes dark
– the monitor display is disturbed

Other system errors can also be subsequent errors of other errors. If the monitor stays dark, the error can only be defined using the CPU displays. The procedure for searching for these errors is exactly the same as for searching for fatal system errors (see section “Locating basic module errors”).
The chart “Other system errors” describes the errors according to their displays on the CPU display. The chart provides information on possible causes of error and possible error rectification methods.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	-	CPU display dark:	CPU defective
		no power supply	check fuse
		program memory card missing or defective	program memory card was not inserted
		CPU defective	

Possible remedy for error:

- Check CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	HC11 defective	CPU defective
		inadmissible interrupt in the initialization phase	

Possible remedy for error:

- Check CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	Module type faulty:	program memory card defective
		EPROM incorrect/defective	CPU defective
		program memory card incorrect/defective	

Possible remedy for error:

- Check program memory card or CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	Module checksum faulty:	program memory card defective
		EPROM defective	CPU defective
		program memory card defective	

Possible remedy for error:

- Check program memory card or CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	hardware error (line test)	CPU defective

Possible remedy for error:

- Check CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	Invalid CPU number:	program memory card defective
		incorrect EPROM	CPU defective
		program memory card defective	

Possible remedy for error:

- Check program memory card or CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	LCA register faulty	CPU defective
		LCA defective	power unit defective
		power unit status incorrect	
		module carrier faulty	

Possible remedy for error:

- Check CPU, check power unit.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	RAM error	CPU defective
		RAM defective	

Possible remedy for error:

- Check CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	Hardware error:	CPU defective
		arithmetic processor (APU) defective	
		HC11 defective	
		AD-converter defective	

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
		DA-converter defective	

Possible remedy for error:

- Check CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
8	flashing	Power unit LCA charging error:	power unit defective
		LCA on power unit defective	
		module carrier defective	

Possible remedy for error:

- Check power unit.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
9	flashing	monitor faulty	monitor defective
		line from monitor to CPU faulty	line defective
		CPU faulty	CPU defective

Possible remedy for error:

- Check monitor, line and CPU, see section “Basic module errors”.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	“CONFIG” -Programming Error	CPU defective
		HC11 defective	
		CPU defective	

Possible remedy for error:

- Replace CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	bus controller error	power unit defective
		common memory card in power unit missing	common memory card or CPU defective
		module carrier faulty	

Possible remedy for error:

- Check common memory card, check power unit, check CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	HC11 hardware error	CPU defective
		AC-converter defective	
		CPU defective	

Possible remedy for error:

- Check CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	firmware loader error	program memory card defective or incorrect software status CPU may be defective

Possible remedy for error:

- Replace program memory card or software, replace CPU.

Errors on the central processing unit			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	Incorrect EPROM type: P=Program-EPROM=E0, C=Charts-EPROM=E1 (1st letter of directory)	program memory card incorrect/defective
		EPROM switched/defective	CPU defective
		program memory card switched/defective	

Possible remedy for error:

- Check program memory card, check CPU.

Other system errors			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	static	watchdog appeared and global reset	program flow error[1] CPU defective

[1] Program flow error: Program flow interrupted by an error.

Possible remedy for error:

- Check CPU.

Other system errors			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	static	recursive error, PPI bus driver and global reset (interrupt logic may be defective)	program flow error[1] system overload[2] CPU defective

[1] Program flow error: Program flow interrupted by an error.
[2] System overload: The maximum permitted times for program run-through, data transfer etc. can no longer be maintained due to an error.

Possible remedy for error:

- Check CPU, check power unit.

Other system errors			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	static	clock monitor fail and global reset	CPU defective
		oscillator defective	
		CPU defective	

Possible remedy for error:

- Check CPU.

System states			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	temporary	firmware being loaded	Appears at first start.
		Note: central segment flashing	New TMS software being loaded.

Possible remedy for error:

- Status indicator

System states			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	static	FATAL SYSTEM-ERROR has occurred (CPU not 0)	error will be displayed on monitor

Possible remedy for error:

- see error description, test system

System states			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	static	FATAL SYSTEM-ERROR has occurred and global reset (CPU=0)	error will be displayed on monitor

Possible remedy for error:

- see error description, test system

System states			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	no monitor connected to CPU	monitor defective line defective CPU defective

Possible remedy for error:

- Check monitor, check line, check CPU.

System states			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	flashing	TxD/RxD shorted monitor line test with jumper plug	display only during monitor line test

Possible remedy for error:

- no

System states			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	temporary	CPU0 has identified “control OFF” (from PU P) and recovered data.	Display frozen: power unit error
		then system shut down	

Possible remedy for error:

- Replace power unit or CPU.

System states			
CPU display	**Type of display**	**Error description, possible causes of error for customer service**	**Possible causes of error**
	static	CPU malfunction	hardware defective

Possible remedy for error:

- Replace program memory card or CPU.

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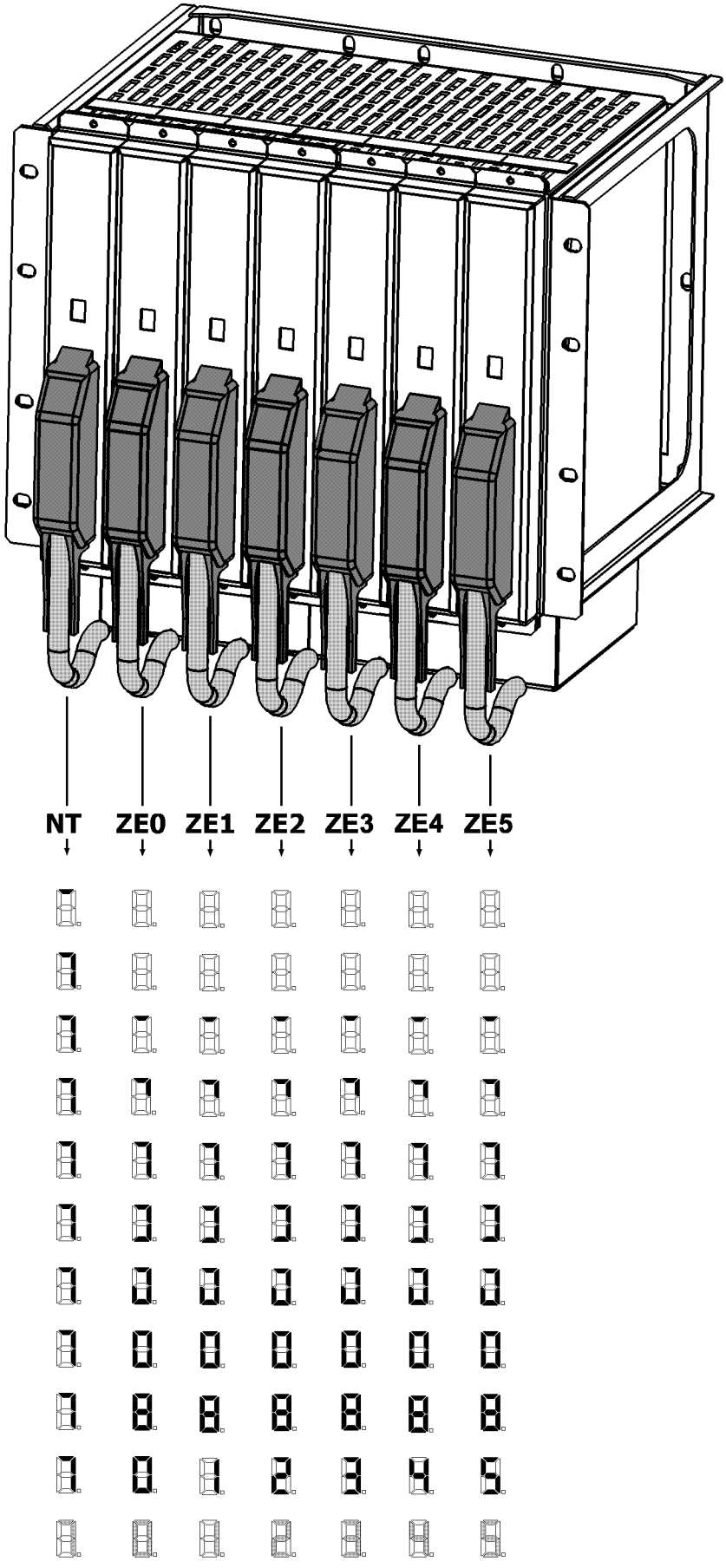

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1.3.6 Locating basic module errors

The following describes how you can locate and rectify unique power unit errors, initialization errors and system errors.
If one of these errors appears when starting or operating the LICCON computer system (display as described in the previous sections), please observe the following:

– A loose or bad contact or fluctuations in the power supply can cause these errors. For this reason, such errors could also appear briefly.
– The error shown on the monitor could be a subsequent error and could also have subsequent errors which are displayed on the CPU displays.

- Switch off the LICCON computer system and restart it after waiting for at least 5 seconds.
- Repeat this procedure up to three times (wait 2 minutes after 3 start attempts).

Result: If a hardware error was the cause, this will probably be identified as an initialization error upon initialization. Initialization errors can only be displayed on the monitor if they are determined on a CPU to which a monitor is connected.

- If the same error image appears several times:
  Switch off LICCON computer system.
- Open the control cabinet on the turntable in order to be able to observe the CPU displays.

Two persons are necessary for the following procedure.

- First person: Restart the crane from the crane cab.
- Second person: Observe the CPU displays in the control cabinet carefully.

The continuous setpoint state is shown in the picture:
1st line: Power unit displays a line, CPU displays are dark:
The control is switched off.
2nd line: Power unit displays a “7”, CPUs are dark:
This display appears when the crane is switched on.
3rd to 9th lines: Power unit displays a “7”:
When the LICCON computer system is running up, the individual segments of the CPU displays are displayed in sequence to show the results of the successful automatic checks which are being carried out (see illustration). Individual CPUs, particularly those with monitors, could be slightly slower in running up.
10th line: After running-up (=after the end of testing for initialization errors) each CPU displays the CPU number in its display.
11th line: The CPU changes its display immediately to half strength brightness.
Testing for the presence of system errors begins

- Note the power unit display.

Troubleshooting
Power unit display does **not** correspond with the required display?
There is probably a unique power unit error.

- See the section “Unique power unit errors”.

Troubleshooting
Power unit **not** displaying the “7”?
There is probably a power unit error.

- Check the power supply of the LICCON computer system.
- Check the power unit, see description in section “Power unit”.

Troubleshooting

Power unit display displays the “7” and **all** CPU displays remain dark?

There may be an error on a CPU or the program memory card in this group.

- Check all CPUs, see description in section “Central processing unit”.

Troubleshooting

Power unit display displays the “7” and **one** CPU display remains dark?

There may be an error on this CPU or program memory card. The CPU which deviates first from the required display sequence has determined the error. It is probable that the error is on this CPU.

- Check all CPUs, see description in section “Central processing unit”.

Troubleshooting

The first flashing CPU to deviate from the setpoint state appears **before** all CPUs display their CPU numbers for the first time (state no. 10).

An **initialization error** has occurred.

- Refer to the chart “Errors on the central processing unit” in the section “Other system errors” for possible error rectification measures.

Troubleshooting

The first CPU to deviate from the setpoint state appears **after** all CPUs have displayed their CPU numbers for the first time (state no. 10)?

A **system error** has occurred.

- Find out whether this is a fatal system error or another system error.

Troubleshooting

The first CPU display to deviate from the setpoint state is a static **“E”** ?

A **fatal system error** has occurred.

- Refer to the chart of fatal system errors (FATAL SYSTEM-ERROR) in the section “System errors” for possible error rectification measures.

Troubleshooting

The first CPU display to deviate from the setpoint state is a static or flashing sign?

An **other system error** has occurred.

- Refer to the chart of other system errors in the section “System errors” for possible error rectification measures.

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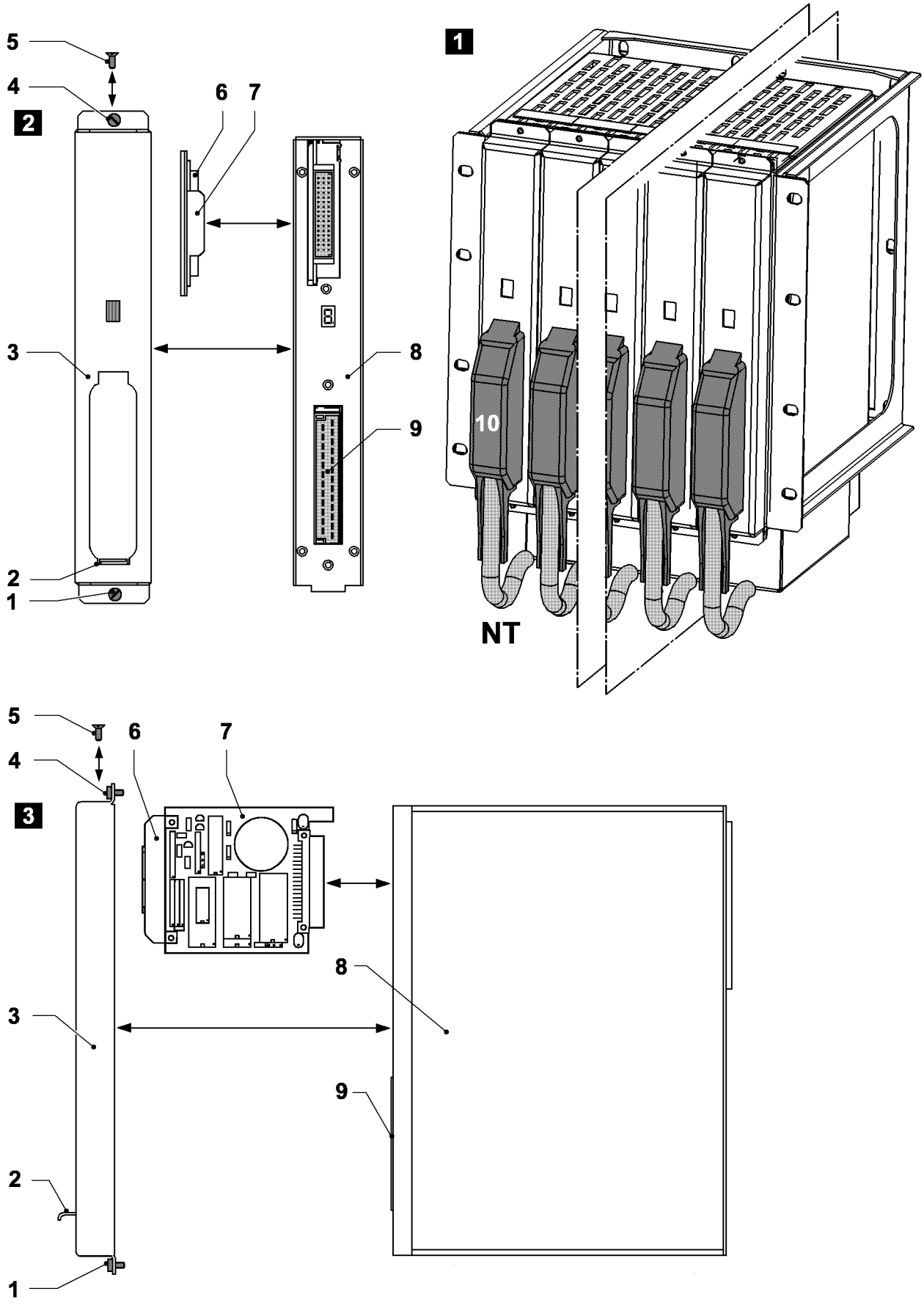

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1.3.7 Checking the power unit

Illustration **1** shows the power unit (PU) when fitted.
Illustration **2** shows the individual parts of the power unit as seen on the control cabinet.
Illustration **3** shows a side view of the individual parts of the power unit.
During the checking procedure, test whether the power unit **8** and the common memory card **7** inserted in it are properly pushed in. To do this, remove and refit the power unit **8** used and the common memory card **7** once.
Ensure that the crane is switched off.

1.3.8 Dismounting the power unit

Ensure that you have a screwdriver to hand.

Notice!
Removing the power unit plug
When pulling out the power unit plug from the socket, the stand-by power supply of the module will be interrupted.
! This will result in a cold start. The stored set-up state data and the adjusting events will be lost.

- Push lightly down and unlock the locking spring **2** on the front cap **3** with a screwdriver. At the same time, pull out the power unit plug **10** and remove it from the socket **9**.
- Unscrew screw **1** and screw **4**. The screws remain screwed to the front cap **3**.
- Pull out the power unit insert firmly.
- Undo screw **5** on the front cap **3** of the power unit. Demount and remove the front cap **3** at the bottom on the power unit **8**.
- Pull the common memory card **7** on the holder **6** out of the power unit **8**.

1.3.9 Fitting the power unit

Caution!
Danger of damage to the plug connections!
When inserting the common memory card **7** into the power unit, the plug connections could be damaged.
! Press the common memory card **7** lightly on at first, then insert firmly to the limit position.

- Hold the common memory card **7** on the holder **6** and push it into the power unit **8**.
- Attach the front cap **3** at the bottom on the power unit **8**. Tighten the screw **5** on the top on the front cap **3** of the power unit and mount the front cap **3**.

Caution!
Danger of damage to the plug connections!
When inserting the power unit **8** the plug connections could be damaged.
! Press the power unit **8** lightly on at first, then insert firmly to the limit position.

- Push the power unit insert into the basic module carrier.
- Screw in screw **1** and screw **4** on the front cap **3**.

Caution!
Danger of equipment damage!
The locking spring **2** must engage so that it can execute its function properly.
! When inserting the power unit plug **10** into the socket **9**, allow the locking spring **2** to engage.

- Insert the power unit plug **10** in the socket **9**.
- Start the crane.
- Check whether the error occurs once more.

Troubleshooting

Error occurs again?

- Replace the power unit **8** used with a replacement power unit.

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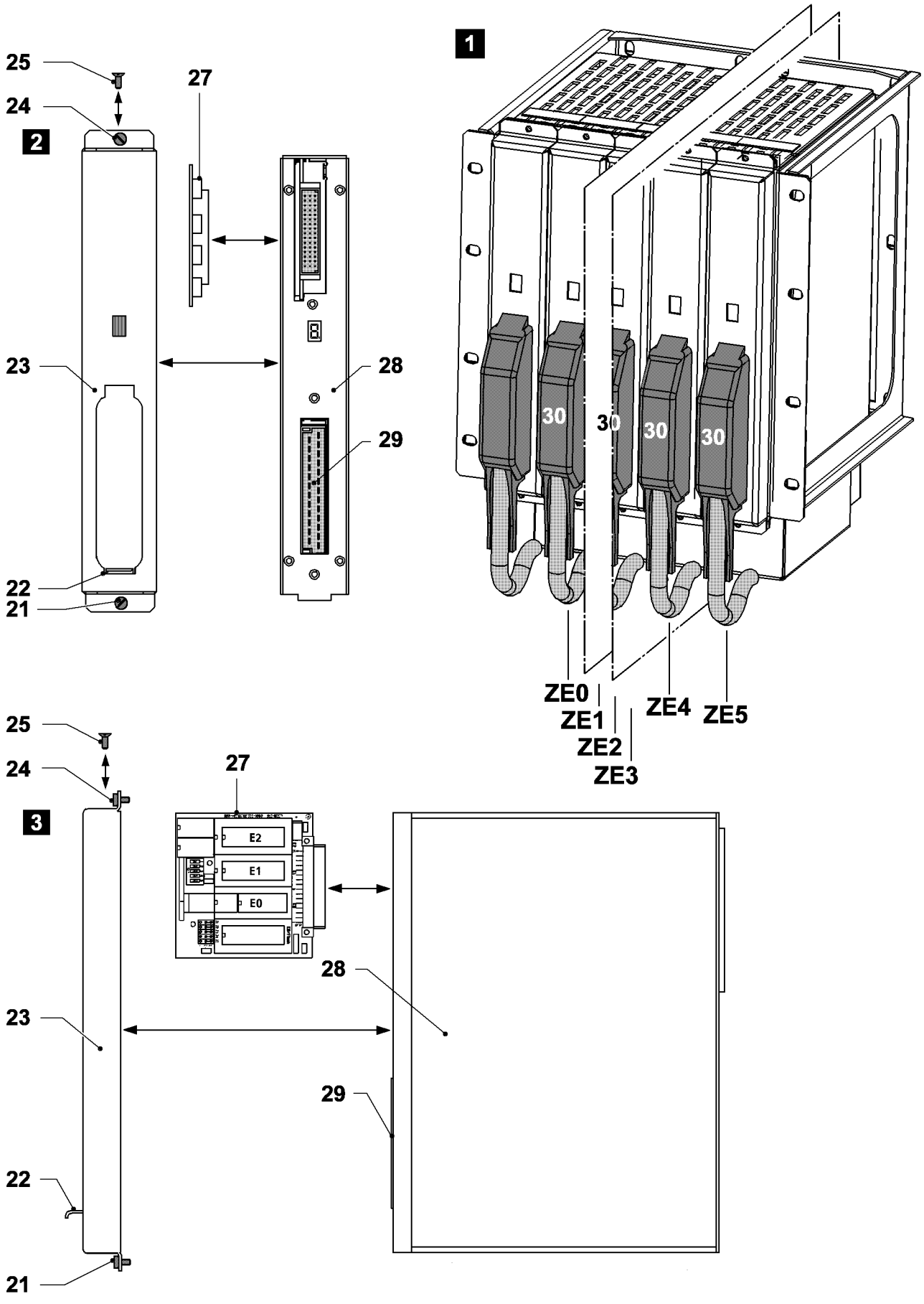
1
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3
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24
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30
ZE0
ZE1
ZE2
ZE3
ZE4
ZE5
E2
E1
E0

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1.3.10 Checking the central processing unit

Illustration **1** shows the central processing unit when fitted.
Illustration **2** shows the individual parts of the central processing unit as seen on the control cabinet.
Illustration **3** shows a side view of the individual parts of the central processing unit.
During the checking procedure, test whether the central processing unit **28** and the program memory card **27** inserted in it are properly pushed in. To do this, remove and refit the central processing unit **28** used and the program memory card **27** once.
Ensure that the crane is switched off.

1.3.11 Dismounting the central processing unit

Ensure that you have a screwdriver to hand.

Notice!
Pulling out the central processing unit
! When pulling out the central processing unit from the module carrier, the stand-by power supply of the CPU will be interrupted. This results in a cold start on this central processing unit. The set-up state data and the adjusting events stored on this CPU are lost. The values must be subsequently reset.

- Push lightly down and unlock the locking spring **22** on the front cap **23** with a screwdriver. At the same time, pull out the output plug **30** and remove it from the socket **29**.
- Unscrew screw **21** and screw **24**. The screws remain screwed to the front cap **23**.
- Pull out the central processing unit insert firmly.
- Undo screw **25** on the front cap **23** of the power unit. Demount and remove the front cap **23** at the bottom on the central processing unit **28**.
- Pull the program memory card **27** out of the central processing unit **28**.

1.3.12 Fitting the central processing unit

Caution!
Danger of damage to the plug connections!
When inserting the program memory card **27** into the central processing unit, the plug connections could be damaged.
! Press the program memory card **27** lightly on at first, then insert firmly to the limit position.

- Push the program memory card **27** into the central processing unit **28**.
- Attach the front cap **23** at the bottom on the central processing unit **28**. Tighten the screw **25** on the top on the front cap **23** of the central processing unit and mount the front cap **23**.

Caution!
Danger of damage to the plug connections!
When inserting the central processing unit the plug connections could be damaged.
! Press the central processing unit lightly on at first, then insert firmly to the limit position.

- Push the central processing unit insert into the basic module carrier.
- Screw in screw **21** and screw **24** on the front cap **23**.

Caution!
Danger of equipment damage!
The locking spring **22** must engage so that it can execute its function properly.
! When inserting the output plug **30** into the socket **29**, allow the locking spring **22** to engage.

- Insert the output plug **30** in the socket **29**.
- Start the crane.
- Check whether the error occurs once more.

Troubleshooting
Error occurs again?
- Replace the central processing unit used with a replacement central processing unit.

1.4 Application errors

Application errors are errors which can occur during crane operation due to incomplete construction of the crane, incorrect operation or due to external influences.
The application errors shown on the monitor are subdivided into:
1.) Application errors **without** LICCON-Error-Code
2.) Application errors **with** LICCON-Error-Code

Errors which occur due to crane operation are subdivided into:
1.) Errors which **lead to** shut-down. Shut-down is always displayed by the shut-down symbol.
2.) Errors which **do not lead to** shut-down. The crane operator will be warned about this.

1.4.1 Application errors without LICCON-Error-Code

External influences which lead to an application error without LICCON-Error-Code are:
– removal of central processing unit from the basic module
– removal of power unit from the basic module
– interruption of the power supply to the LICCON computer system

This leads to a data loss in the battery-buffered data memory of the central processing unit(s).
When this occurs, the system will execute a **cold start**, i.e. a restart of the LICCON computer system.
The cold start can already be identified in the configuration screen.
Consequences and identification characteristics of a cold start:
– The original configuration state is lost. The 1st configuration state will be reset in the configuration screen.
– The reeving “0” is set with the displayed configuration state.
– The incremental counters of the affected central processing units will be set to “0”. This means that the absolute winch path measurement and the current winding radius are lost.
– The winches are deactivated, which is displayed in the winch status display by two double slashes (see chapter 4.02, “Configuration”).

☞ **Notice!**
Winch display
! The winch display is running, but is incorrect.

Measures after a cold start data loss:
– Ensure the power supply to all power units and central processing units.
– Reset lost parameters in the programs “Configuration” and “Control parameter”.
– Realign the winches. Move the alignment position.

☞ **Notice!**
Alignment position
! The alignment position can lie in different positions of the winches (dependent on crane type).

LEC	Error description	Possible cause of error
without LEC	overload - STOP-symbol element flashing	The permitted “maximum load according to the load chart and reeving” for the relevant configuration and operating state has been exceeded.

Remedying the overload status depends on how the overload occurred and a decision should be made by the crane operator according to the individual situation.
It should be ensured that by bypassing the overload protection only the crane movement that is opposed to the crane movement which caused the overload shut-down is made.
Measures in this respect include:

Danger!
Risk of fatal injury!
By setting down the load, the crane can in certain cases (for example with: derrick ballast raised; **F1** less than / equal to **F1min**) tip over. There is a danger of FATAL INJURY.

! You should only set down the load after testing the load torque carefully and after executing load torque minimizing measures (for example: lowering the derrick ballast).

- Set down the load and lifting gear.

or

Danger!
Risk of accident!

! An auxiliary switch on the armrest can enable luffing up with a suspended load, thereby diminishing the load torque.

■ Please take the utmost care when working in this situation.

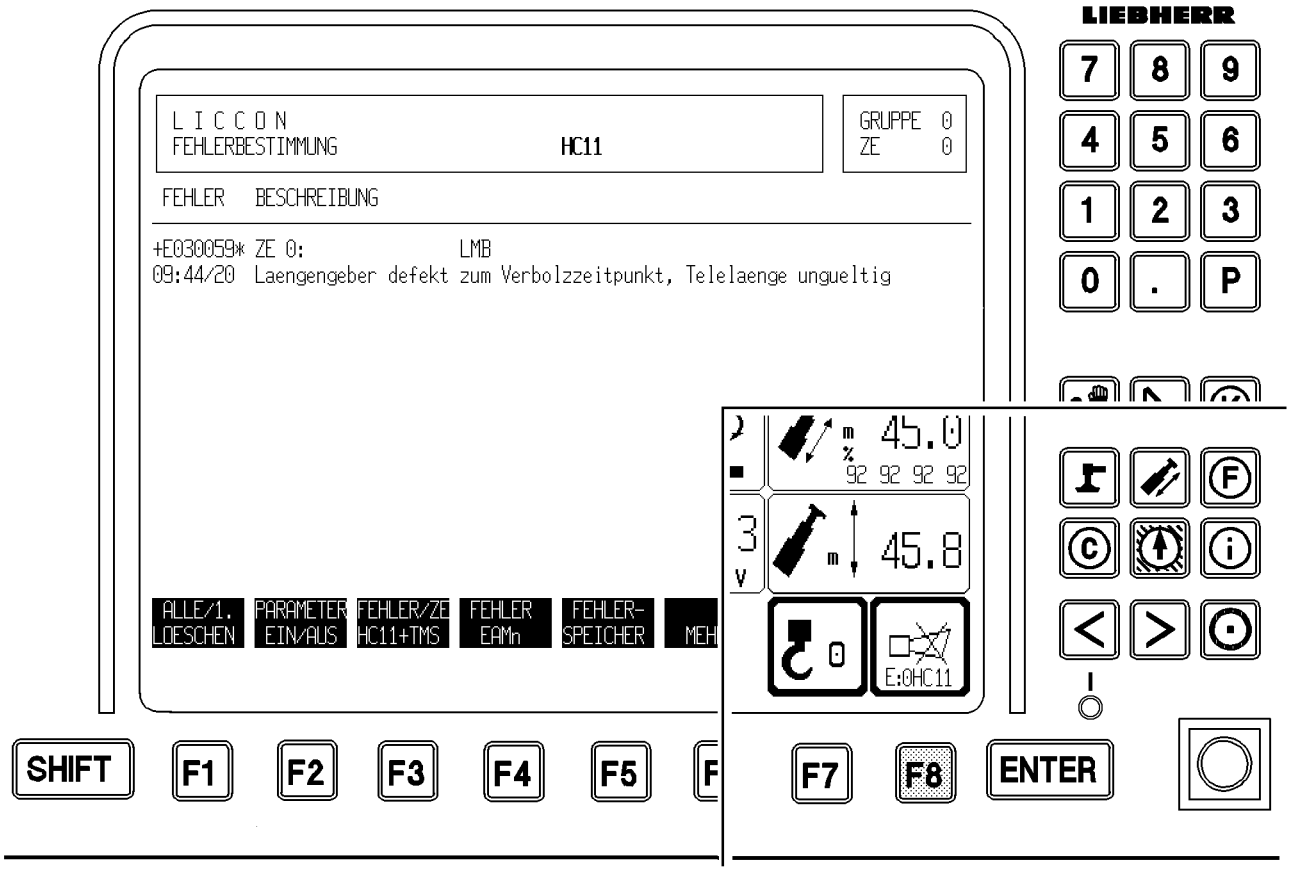
- Work with diminished load torque.

LEC	Error description	Possible cause of error
without LEC	wind sensor symbol element flashing	The maximum permitted wind speed has been exceeded.

Danger!
Risk of accident!

! If necessary, strip down the crane or stop crane operation.

- If possible:
  Set up and adjust operating mode and configuration state with a more suitable load chart.
- If this is not possible, stop crane operation.


LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
HC11
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG
+E030059* ZE 0: LMB
09:44/20 Laengengeber defekt zum Verbolzzeitpunkt, Telelaenge ungueltig
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER-SPEICHER
MEH
45.0
92 92 92 92
45.8
E:0HC11
7 8 9
4 5 6
1 2 3
0 . P
SHIFT
F1
F2
F3
F4
F5
F7
F8
ENTER

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1.4.2 Application errors with LICCON-Error-Code

Notice!
LICCON error determination!
! See also the section “LICCON error determination”.

The functions of the following sensors are monitored:
– Hoist limit switch
– Angle sensor
– Pressure sensor
– Length sensor

The limits of the sensors are monitored for the following limit errors:
– Open circuit
– Short circuit to earth
– Short circuit to +24 Volt (supply voltage)

A distinction is made between the following application error types:
– Errors due to a technical defect
– Errors due to crane operation
– Errors due to external influences

Notice!
LMB errors!
Generally, the higher the LICCON-Error-Code in the case of **LMB errors** (4th, 5th and 6th position), the higher the danger from the error.
! 0<LEC<64: No LMB shut-down, actual value calculation
! from 64: An LMB shut-down takes place (=shut-down of load torque increasing movements)

Application errors will be displayed dynamically in the program “Operation”, “Telescoping”, “Support” with an error message. An acoustic signal also sounds.

- Press function key **F8** once.

Result: Acoustic signal is switched off.

- Press function key **F8** twice.

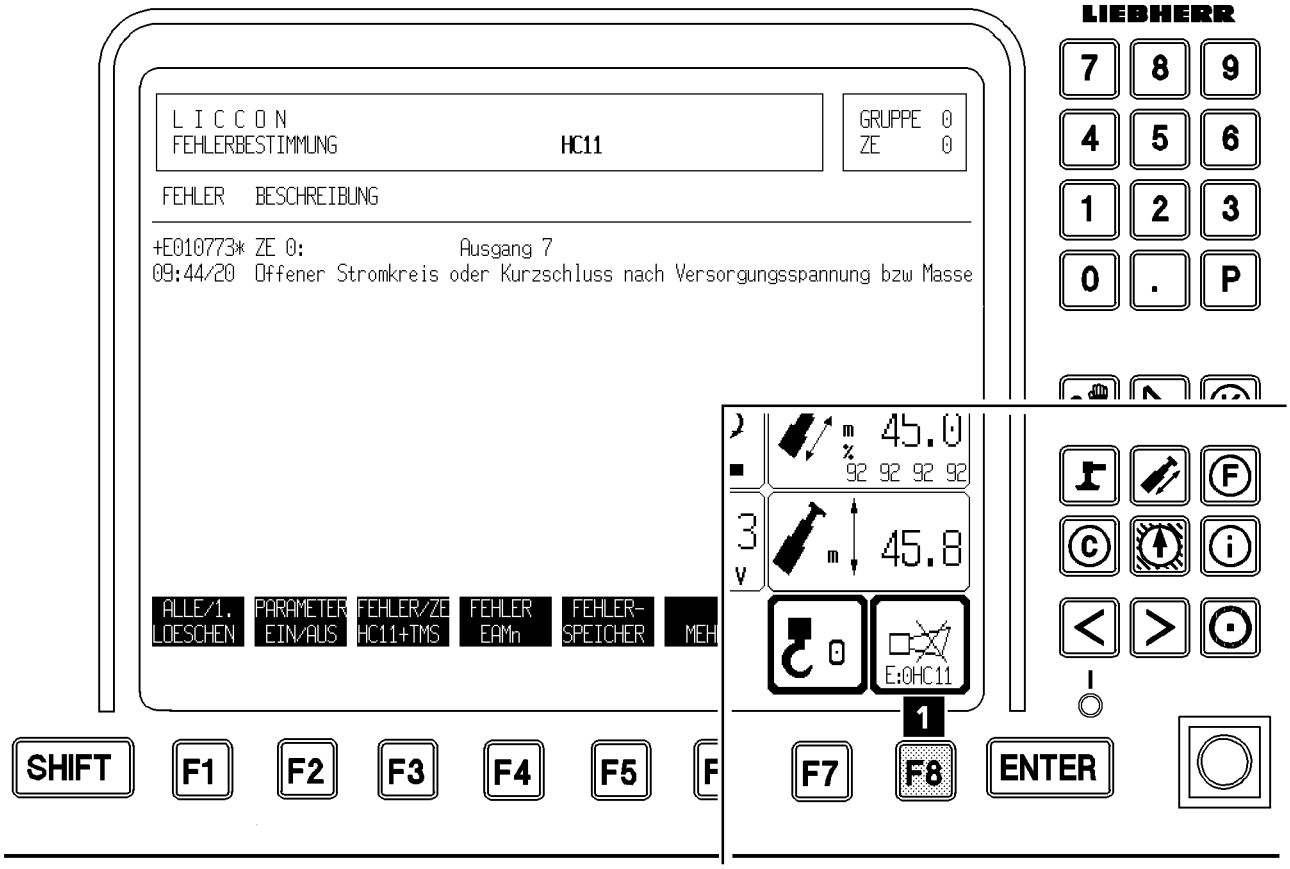
Result: Change to error determination screen, program “Test system”. The application error will be documented in the LICCON-Error-Code (LEC).

LEC	Error description	Possible cause of error
with LEC	hoist limit switch has been activated - hoist limit switch symbol element flashing	The hook block has raised the hoist limit switch weight and thereby activated the hoist limit switch.

Possible remedy for error:

Danger!
Risk of accident!
! Observe the hook block very carefully.
! Ensure that the hook block does not move further upwards.

- Press “Lower hoist gear” on the affected winch until the hook block no longer touches the hoist limit switch weight.


LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
HC11
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG
+E010773* ZE 0: Ausgang 7
09:44/20 Offener Stromkreis oder Kurzschluss nach Versorgungsspannung bzw Masse
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER-SPEICHER
MEH
45.0
92 92 92 92
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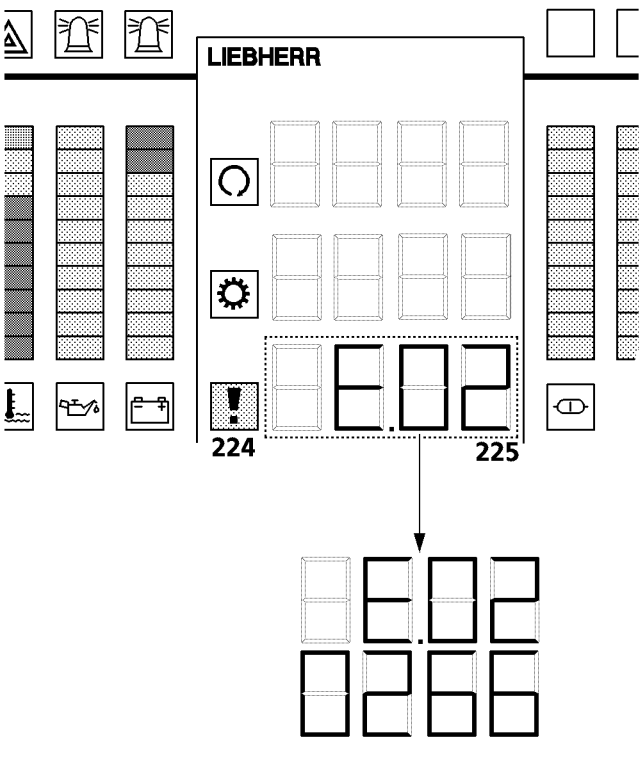
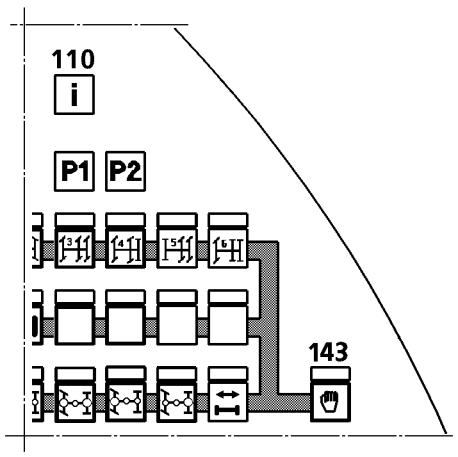
F2
F3
F4
F5
F7
F8
ENTER


LIEBHERR
E.02
224
225
E.02
0266


110
i
P1
P2
143

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1.5 System errors

You can find further information on this subject in the section “LICCON error determination”.

☞ **Notice!**
Switch off the ignition.
! Switching off the ignition deletes **all** errors (active and inactive) in the local error vaults.

1.5.1 Superstructure

1.5.2 Active system errors

Only active engine and transmission errors will be treated and displayed as system errors.
System errors will be dynamically displayed in the program “Operation”, “Telescoping”, “Support” with an error message in the symbol element “Horn”.
Example of an active system error, superstructure (illustration **1**): **E:OHC11**
An acoustic signal also sounds.

- Press function key **F8** once.

Result: Acoustic signal is switched off.

- Press function key **F8** twice.

Result: Change to error determination screen, program “Test system”. The system error will be documented in the LICCON-Error-Code (LEC). Example: active system error superstructure +E010773

1.5.3 Inactive system errors

Inactive errors can be displayed using function key **F2** in subprogram “PARAMETER ON”.
Identification in this case is “-”.
Example of an inactive system error, superstructure: **- E010773**

- If inactive errors are to be displayed:
  Press function key **F2**.

1.5.4 Chassis

1.5.5 Active system errors

Only active engine and transmission errors will be treated and displayed as system errors.
If there is a system error, the warning light **224** on the display unit flashes. Via the **i** -key **110** on the keypad unit, the LICCON-Error-Code (LEC) on the display unit **225** will be alternatingly displayed for the duration of the operation. This means that the entire LEC will be alternately displayed.
Example of an active system error, chassis: **E.02 0266**

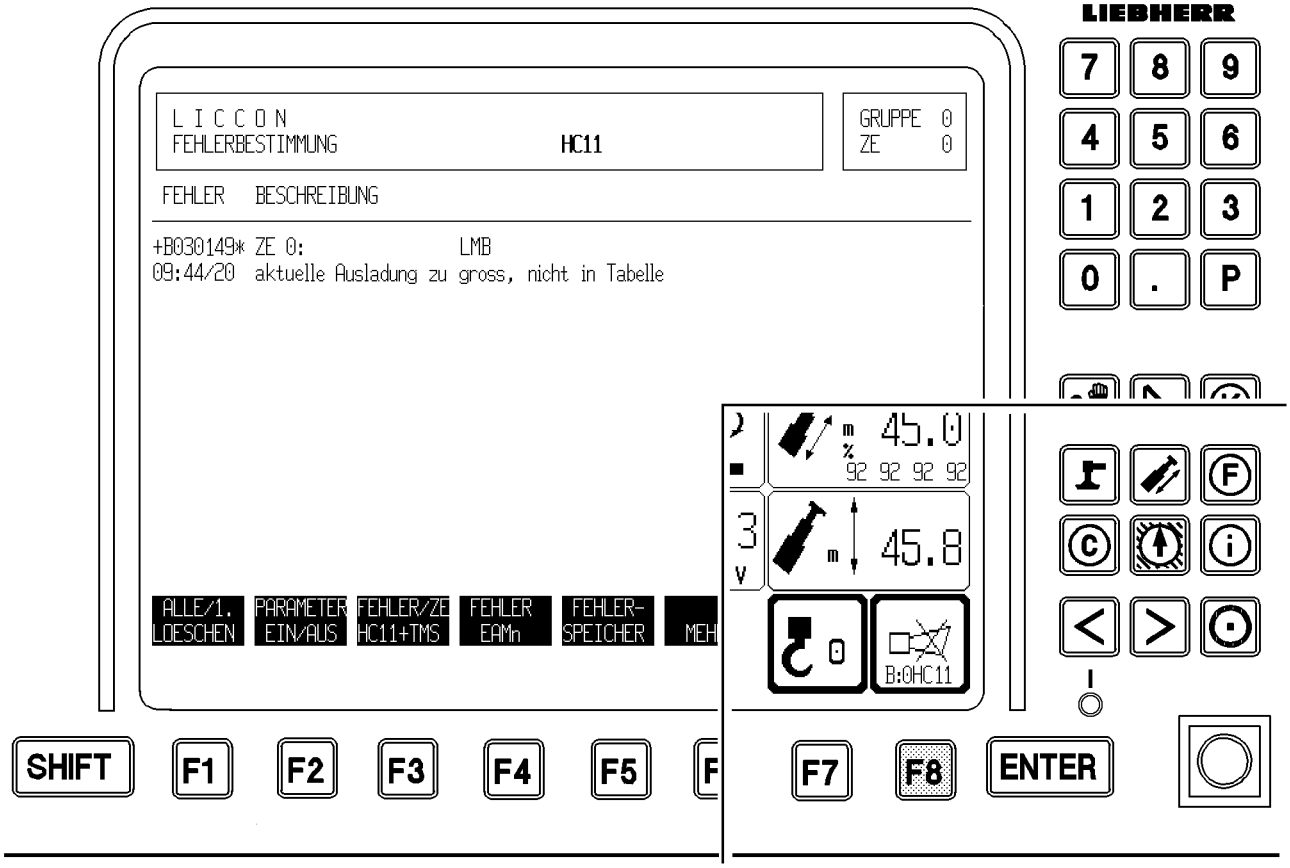
- If several active errors are present at the same time:
  Press the **i** -key **110** again.

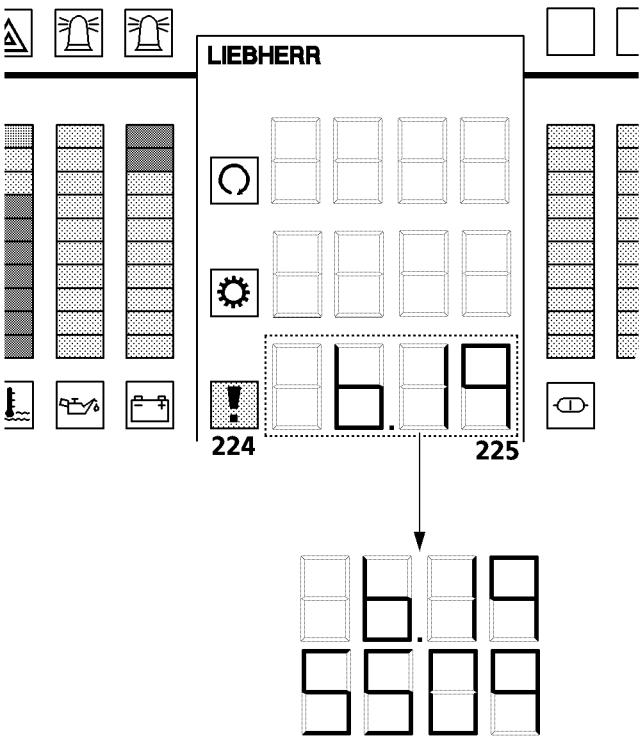
Result: All existing active errors will be displayed.
Once all existing errors have been displayed “End.” appears on the display unit **225**. By pressing the **i** -key **110** again, the first error will be displayed once more.

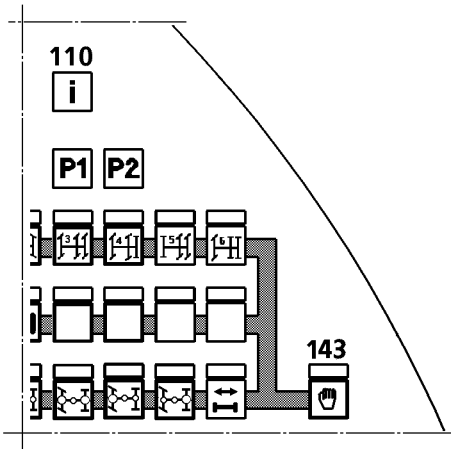
1.5.6 Inactive system errors

Inactive errors can be displayed by pressing the hand key **143** and the **i** -key **110** on the display unit **225** at the same time. Identification in this case is “-”.
Example of an inactive system error, chassis: **-E.02 0266**

- If inactive errors are to be displayed:
  Press the hand key **143** and the **i** -key **110** simultaneously.


LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
HC11
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG
+B030149* ZE 0: LMB
09:44/20 aktuelle Ausladung zu gross, nicht in Tabelle
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER-SPEICHER
MEH
45.0
92 92 92 92
45.8
B:0HC11
7 8 9
4 5 6
1 2 3
0 . P
SHIFT
F1
F2
F3
F4
F5
F7
F8
ENTER


LIEBHERR
224
225


110
i
P1
P2
143

B197894

1.6 Operating errors

You can find further information on this subject in the section “LICCON error determination”.

1.6.1 Superstructure

1.6.2 Operating errors in the program “Operation”, “Telescoping”, “Support”

Operating errors will be dynamically displayed in the program “Operation”, “Telescoping”, “Support” with an error message in the symbol element “Horn”.
An acoustic signal also sounds.

- Press function key **F8** once.

Result: Acoustic signal is switched off.

- Press function key **F8** twice.

Result: Change to error determination screen, program “Test system”.
The operating error will be documented in the LICCON-Error-Code (LEC).
The operating error is always displayed at the very top in the error vault.
If there are several operating errors present on different CPUs and I/O modules: The operating error with the lowest CPU or I/O module number will be displayed.
Slewing gear operating error: CPU0
Telescoping operating error: CPU1
Winch1/2 / luffing operating error: CPU2
To find out why a crane function is not functioning: In the case of several existing operating errors, go, in the error determination screen, to the CPU on which the actual crane function is performed.

1.6.3 Operating errors in the program “Configuration”

In the configuration screen, only the operating errors originating in the program “Configuration” will be displayed for approx. 5 seconds.

- Within these 5 seconds, press the function key **F8** once.

Result: Change to error determination screen, program “Test system”.
Error visible in error determination display.

- After the 5 seconds, press the function key **F8** once.

Result: Change to error determination screen, program “Test system”.
Error **not** visible in error determination screen.

- Press function key **F8** twice.

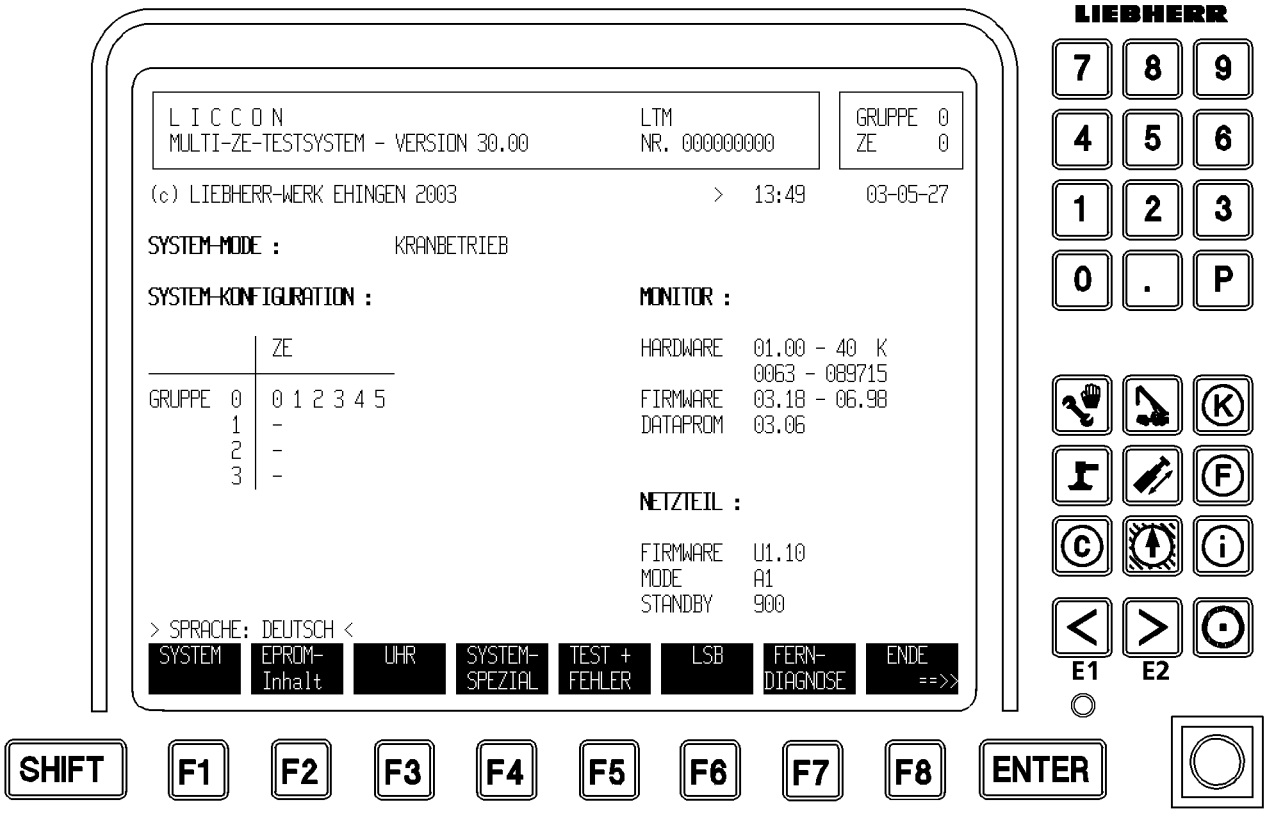
or

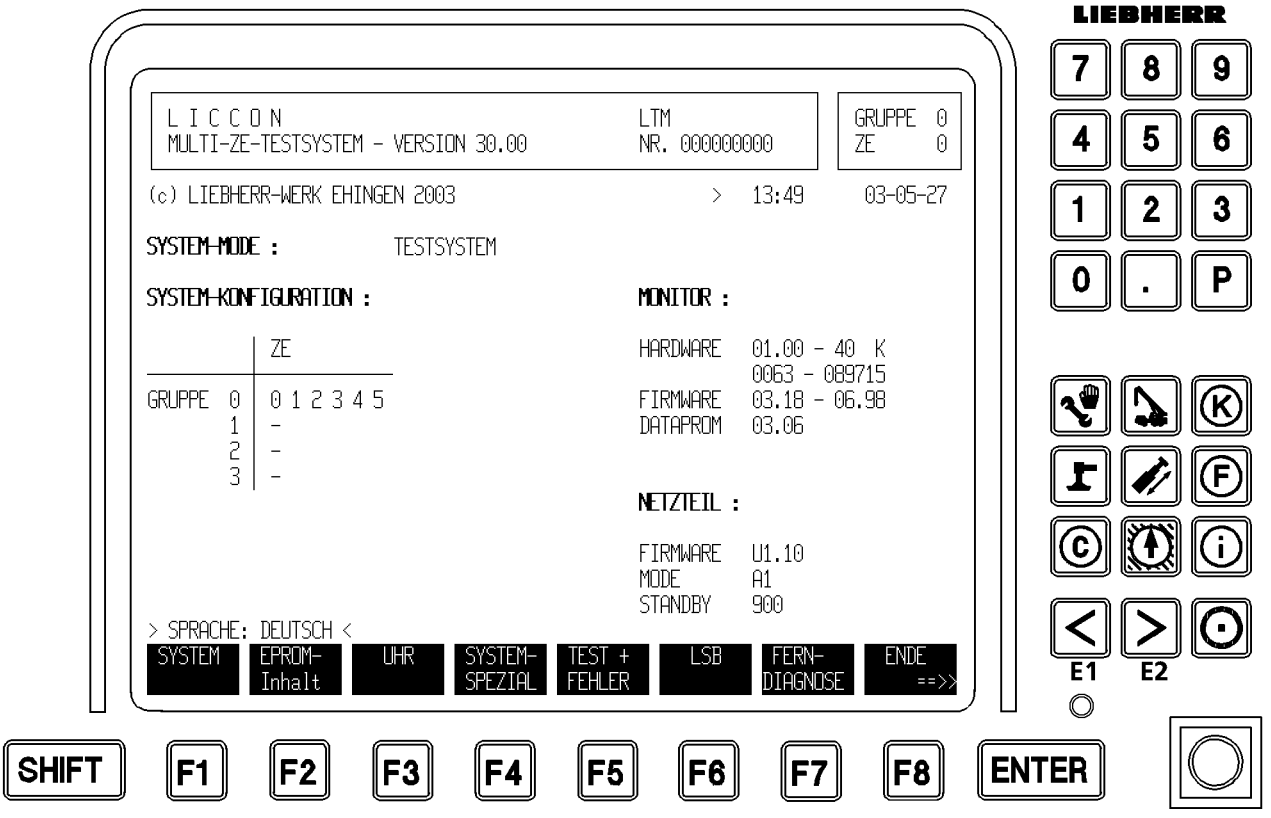
- Press program key **Configuration**.

Result: Change to back to program “Configuration”.

1.6.4 Chassis

If an operating error is caused: The warning light **224** on the display unit **225** illuminates. The operating error “B” will be alternately displayed in the LICCON-Error-Code (LEC) on the display unit **225** (see chapter “Error identification - LICCON computer system”, section “LICCON-Error-Code”).
Example: **b.19 5509**
If an operating error is caused while a system error is present: The warning light **224** on the display unit **225** illuminates. The operating error “B” appears automatically in the LICCON-Error-Code (LEC) on the display unit **225**.


LIEBHERR
L I C C O N
MULTI-ZE-TESTSYSTEM - VERSION 30.00
LTM
NR. 000000000
GRUPPE 0
ZE 0
(c) LIEBHERR-WERK EHINGEN 2003
> 13:49 03-05-27
SYSTEM-MODE : KRANBETRIEB
SYSTEM-KONFIGURATION :
ZE
GRUPPE 0 0 1 2 3 4 5
1 -
2 -
3 -
MONITOR :
HARDWARE 01.00 - 40 K
0063 - 089715
FIRMWARE 03.18 - 06.98
DATAPROM 03.06
NETZTEIL :
FIRMWARE U1.10
MODE A1
STANDBY 900
> SPRACHE: DEUTSCH <
SYSTEM
EPROM-Inhalt
UHR
SYSTEM-SPEZIAL
TEST + FEHLER
LSB
FERN-DIAGNOSE
ENDE ==>>
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER


LIEBHERR
L I C C O N
MULTI-ZE-TESTSYSTEM - VERSION 30.00
LTM
NR. 000000000
GRUPPE 0
ZE 0
(c) LIEBHERR-WERK EHINGEN 2003
> 13:49 03-05-27
SYSTEM-MODE : TESTSYSTEM
SYSTEM-KONFIGURATION :
ZE
GRUPPE 0 0 1 2 3 4 5
1 -
2 -
3 -
MONITOR :
HARDWARE 01.00 - 40 K
0063 - 089715
FIRMWARE 03.18 - 06.98
DATAPROM 03.06
NETZTEIL :
FIRMWARE U1.10
MODE A1
STANDBY 900
> SPRACHE: DEUTSCH <
SYSTEM
EPROM-Inhalt
UHR
SYSTEM-SPEZIAL
TEST + FEHLER
LSB
FERN-DIAGNOSE
ENDE ==>>
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

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1 Multi-CPU test system

The monitor illustrations in this chapter are only examples. The numerical values and crane configurations in the individual illustrations do not have to fit the crane precisely.
The Multi-CPU test system is a diagnostic tool that, among other things, enables malfunctions of LSB components (I/O modules, hoist limit switches, length sensors, angle sensors etc.) on the crane to be located and remedied quickly and easily.
Easy-to-use dialog functions can be used even when the crane is operating to observe all inputs and outputs of the entire system in different representations on the monitor. In addition to this, all registered errors (system errors and operating errors) are documented in the test system.
Certain safety-relevant functions of the Multi-CPU test system are protected from being accessed by operators who are **not** authorized.
Key **E1** and key **E2** are used to select either German or English language versions.

1.1 Starting the Multi-CPU test system

The Multi-CPU test system can be started from two possible states:
– from standard operation (crane operation) in **SYSTEM-MODE: CRANE OPERATION**
– on run-up of the LICCON computer system in **SYSTEM-MODE: TEST SYSTEM**

1.1.1 System mode “CRANE OPERATION”

The programs and the program flow of the LICCON computer system are not influenced. The crane continues to be fully operable and the control system can be inspected using the extensive aids provided by the Multi-CPU test system.

Danger!
Risk of accident!
In system mode “TEST SYSTEM”, the LICCON monitor is only used for functions of the test system. No warnings that indicate that the crane is being operated in fringe ranges will appear.
! Operate the crane with particular care.

- Confirm the operating mode of the crane using the function key **F8**.
- Press program key **P8** (“i” -key).

Result: The Multi-CPU test system will be started in **SYSTEM-MODE: CRANE OPERATION**.

1.1.2 System mode “TEST SYSTEM”

Danger!
Risk of accident!
! The crane cannot be operated in system mode “TEST SYSTEM”.

Only those programs which are required for operating the Multi-CPU test system will be started in the LICCON computer system.
For safety reasons, it is not possible to switch from system mode “TEST SYSTEM” to system mode “CRANE OPERATION”. In this case, turn off the LICCON computer system and restart (see previous section “System mode CRANE OPERATION”)

- Start the LICCON computer system.

Result: An acoustic signal sounds immediately after the LICCON computer system is switched on.

- Now press program key **P8** (“i” -key) within 10 seconds.

Result: The Multi-CPU test system will be started in **SYSTEM-MODE: TEST SYSTEM**.

Troubleshooting
Message **SYSTEM - CHECK . . . . . PASSED - - O.K. ! !** displayed on the monitor?
You did **not** press the program key **P8** (“i” -key) within the 10 second time period. You will now find that you are in the program “Configuration”.

- In this case, turn off the LICCON computer system, restart and after the acoustic signal has sounded, press the program key **P8** (“i” -key) within 10 seconds.

1.1.3 Selecting Central processing unit or Group

The Multi-CPU test system can only access installed units (Group, CPU).

In the right-hand, upper selection window the cursor flashes to indicate the selection of the desired CPU.

- Press key **ENTER**.

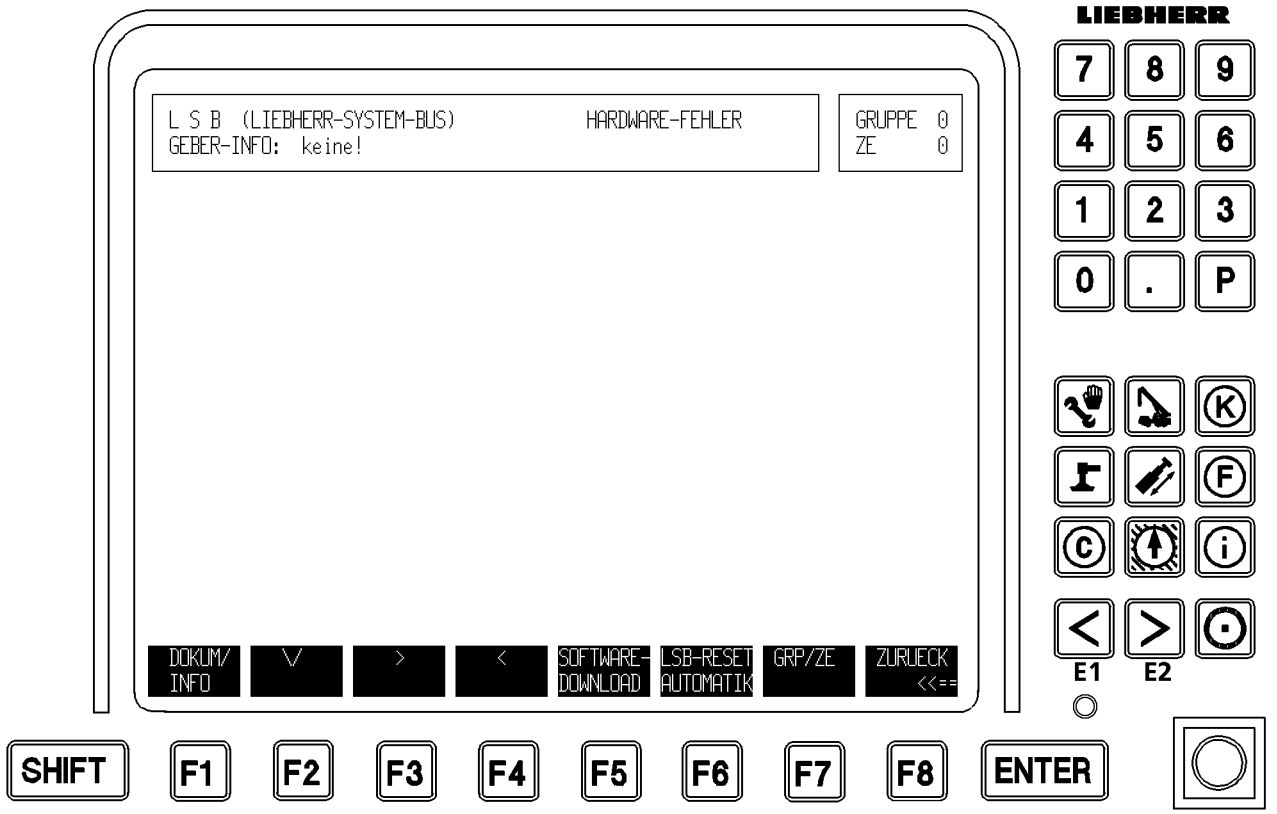
Result: Cursor changes from “CPU” to “Group” and back.

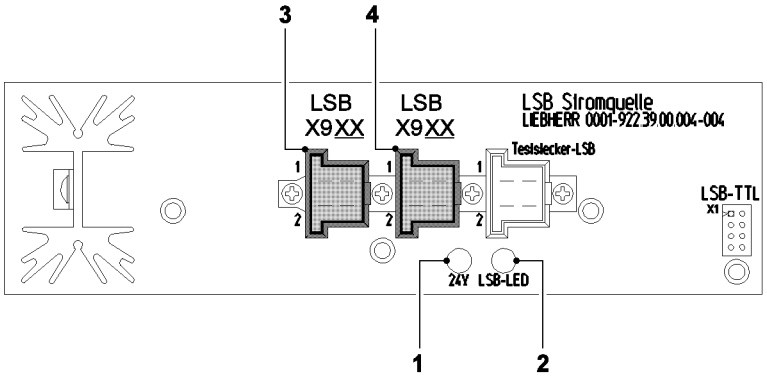
- Enter the desired group or CPU from the installed units using the numeric keys of the alphanumeric key unit.

Function key line

F1	SYSTEM	• Access inputs and outputs, system-internal “specialities”
F2	EPROM - content	• Software of the LICCON-CPUs
F3	CLOCK	• Access-protected function • Adjust, stop or start real time clock (battery-buffered)
F4	SYSTEM-SPECIAL	• Check the complete function units of the crane (only for authorized expert personnel or LIEBHERR service).
F5	TEST + ERROR	• Access errors in the error vaults
F6	LSB	• Call up LSB overview
F7	REMOTE-DIAGNOSTIC-S	• Start remote diagnostics*
F8	END	• Program end, back to program “Operation”

blank page!


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) HARDWARE-FEHLER
GEBER-INFO: keine!
GRUPPE 0
ZE 0
DOKUM/ INFO
SOFTWARE- DOWNLOAD
LSB-RESET AUTOMATIK
GRP/ZE
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER


3
4
LSB X9XX
LSB X9XX
LSB Stromquelle
LIEBHERR 0001-922390.004-004
Testslecker-LSB
LSB-TTL
X1
24V LSB-LED
1
2

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1.2 Hardware error

If a hardware error occurs on one LSB bus, then it is shown on the LICCON monitor, see illustration.

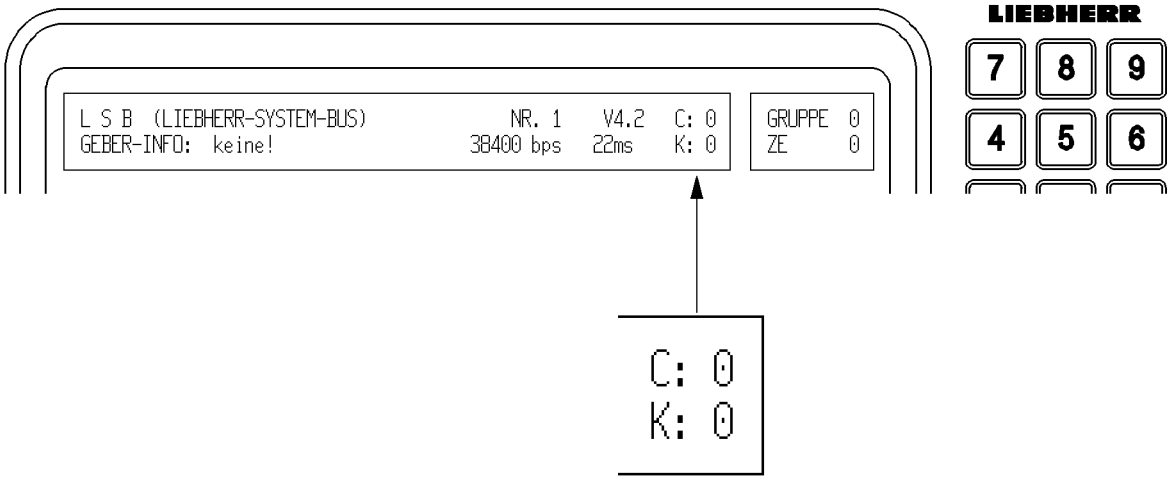
1.2.1 Error determination

Proceed according to the following sequence to determine the hardware error.

– Pull the plug **3** and plug **4** of the LSB power source on the input circuit boards **IPCB0**, **IPCB1**, **IPCB2**, **IPCB3**, **IPCB4**, **IPCB5**
  Note:
  After pulling the plug connections, the “hardware error” on the LICCON monitor turns off
– Check the power supply 24 V (green LED) **1**
  Note:
  When the green LED **1** lights up, the power supply is ensured
– Check data transfer (red LED) **2**

LSB bedplate	**LED function**
Data transfer **OK**	the red LED 2 lights up or flickers at high frequency
Data transfer **faulty**	red LED 2 flashes
Short circuit of data line	red LED 2 is off

☞ **Notice!**
Note
! If the data transfer of one or several input circuit boards is faulty, replace the corresponding LSB power source(s) or CPU’s.
! If no problem is shown by the LED’s, check the sensor and lines


LIEBHERR
7 8 9
4 5 6
L S B (LIEBHERR-SYSTEM-BUS) NR. 1 V4.2 C: 0
GEBER-INFO: keine! 38400 bps 22ms K: 0
GRUPPE 0
ZE 0
C: 0
K: 0

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1.3 Call up LSB overview - general

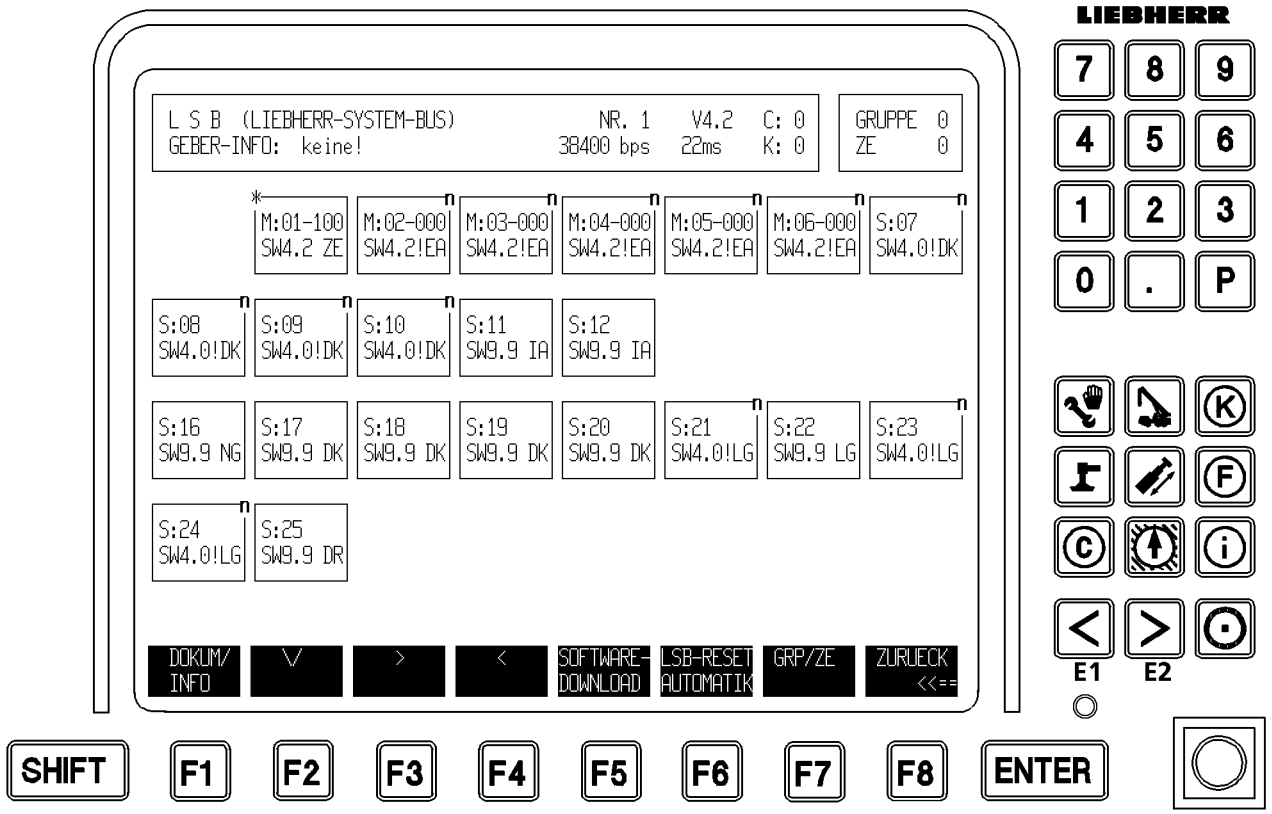
In the LSB overviews, the LSB detail views “Master” the LSB detail views “Slave”, it is shown in the header line of the corresponding overview if the bus system is functioning properly.

☞ **Notice!**
Note
! The bus system is constantly monitored for errors or problems.
! If errors or problems arise on the bus system, then they are shown in the header line

Description of abbreviations:
– C: = check (check the bus system that it is free of errors)
– K: = collision (check for collision of bus data)

	Error / fault
C: 0	no
C: 1, .. 2, .. 3, ..	yes (error in the bus system)
K: 0	no
K: 1, .. 2, .. 3, ..	yes (bus data collided)

☞ **Notice!**
Note
! If a number larger than 0 (zero) is shown, check the bus system!


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 1 V4.2 C: 0
GEBER-INFO: keine! 38400 bps 22ms K: 0
GRUPPE 0
ZE 0
M:01-100 SW4.2 ZE
M:02-000 SW4.2!EA
M:03-000 SW4.2!EA
M:04-000 SW4.2!EA
M:05-000 SW4.2!EA
M:06-000 SW4.2!EA
S:07 SW4.0!DK
S:08 SW4.0!DK
S:09 SW4.0!DK
S:10 SW4.0!DK
S:11 SW9.9 IA
S:12 SW9.9 IA
S:16 SW9.9 NG
S:17 SW9.9 DK
S:18 SW9.9 DK
S:19 SW9.9 DK
S:20 SW9.9 DK
S:21 SW4.0!LG
S:22 SW9.9 LG
S:23 SW4.0!LG
S:24 SW4.0!LG
S:25 SW9.9 DR
DOKUM/ INFO
SOFTWARE- DOWNLOAD
LSB-RESET AUTOMATIK
GRP/ZE
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

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1.4 LSB overview

1.4.1 Grafic LSB overview

All LSB components which are located on the “Liebherr-System-Bus” (LSB) are displayed in the overview image of the selected CPU.
The grafic LSB overview is called up using function key **F6** (**LSB**).
Each individual station is assigned a “box” in which the most important information and a symbolic mark are entered.

Display	**Meaning**
M: or S:	Master (M:) or Slave device (S:)
01	Bus address
1	LSB (only with master device)
00	ID-number (only with master device)
SW4.2	Software version
!CPU	Type identifier CPU, IO, SE, LS, AS, MS, PS, HO, TM

Information

Display	**Meaning**
M:02 116	Master device bus address 02 - LSB1 - Identification 16 (IOM1)
SW4.2 IO	Software version 4.2 (LSB-driver) - Identification IO
S:23	Slave device - Bus address 23
SW4.2 HO	Software version 4.2 (LSB-driver) - Identification Hoist top
S:23	Slave device - Bus address 23
SW4.2!HO	Software version 4.2 (LSB-driver) - Identification Hoist top
	“!” = type identifier setpoint/actual deviates from each other
S:23	Slave device - Bus address 23
SW4.2!??	Software version 4.2 (LSB-driver)
	“!” = type identifier setpoint/actual deviates from each other
	“??” = invalid type identifier

Marks

The marks for the selected LSB components are always located in the left upper corner, the status in the right.

Marks	
*	Selected LSB station
x	Sensor present, but error in its configuration (actual/setpoint value comparison)
o	Sensor not present, although required

Marks	
+	Additional sensor identified, but not configured on bus
s	LSB components (sensors) in simulation mode
n	Optional station (optional) missing

Function key line

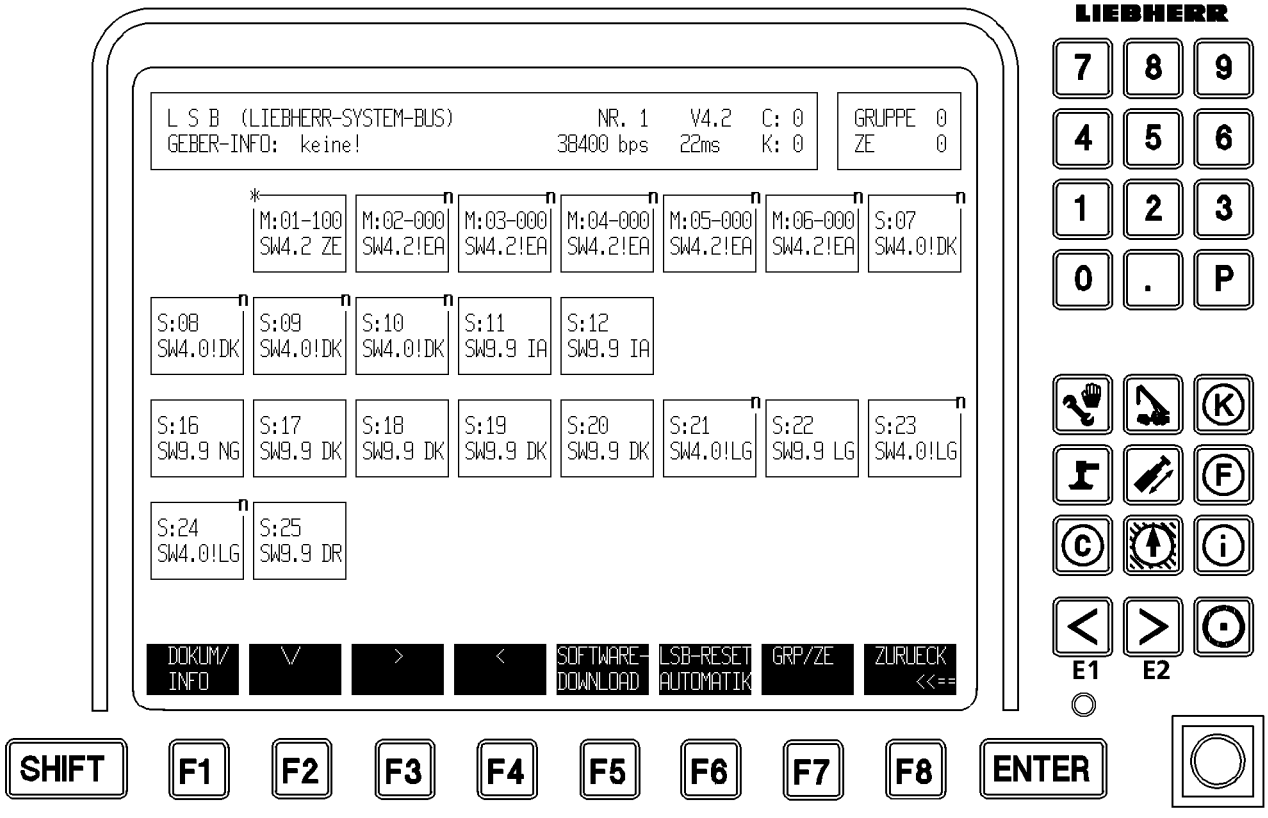
F1 DOKUM / INFO	• Documentation of the grafically represented LSB overview
F2 v	• Select station (LSB component)
F3 >	• Select station (LSB component)
F4 <	• Select station (LSB component)
F6 LSB - RESET	• Reset LSB (LIEBHERR-System-Bus) and reinitialize (Example: newly plugged-in sensor will not automatically be identified)
Shift + **F6** AUTOMATIC	• Automatic LSB sensor programming (see section “Procedure for LSB sensor programming”)
F7 GRP / CPU	• Select desired Group or CPU Use the numeric keys to select the desired GROUP or CPU from the installed units
F8 BACK	• Back towards “Main menu”

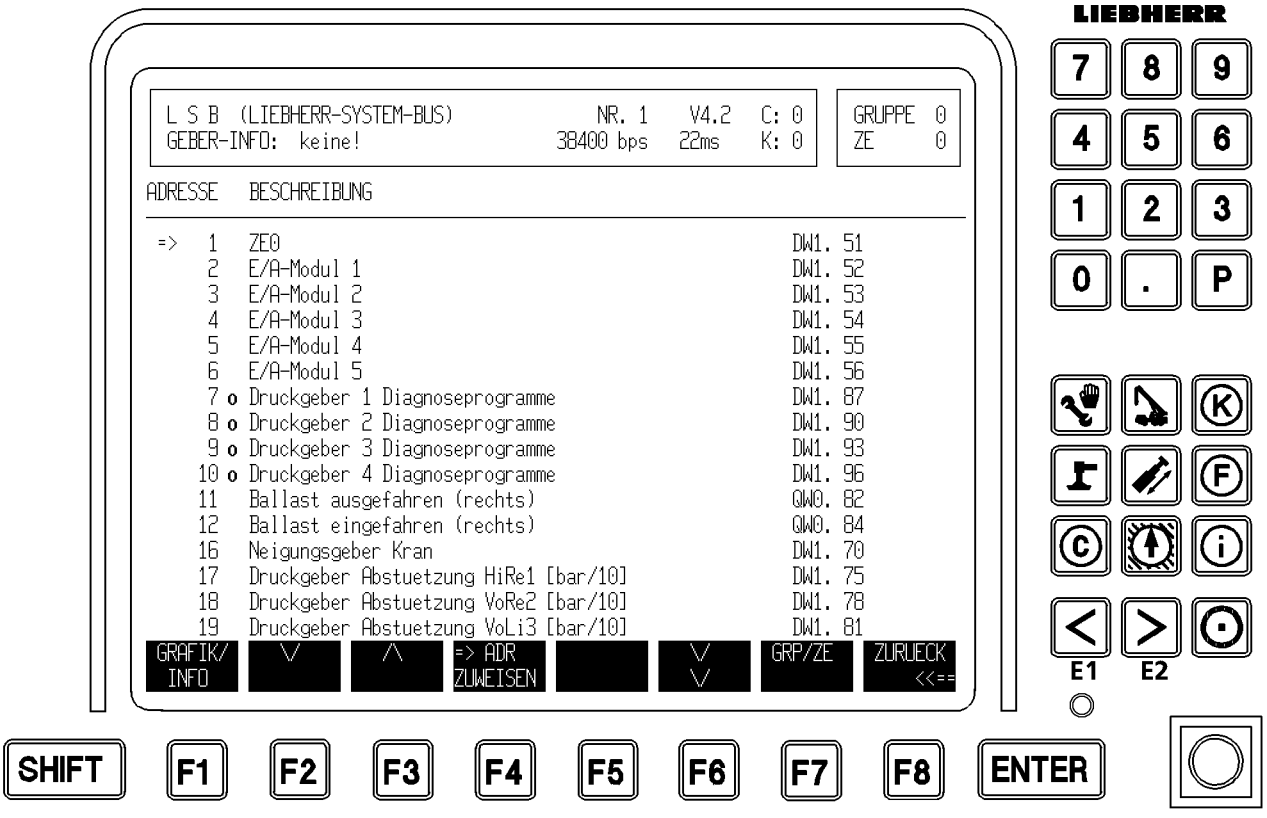
Calling up individual LSB stations

- Select individual LSB stations using the function keys described.
- Press **ENTER** key.

Result: Selected LSB station will be displayed (see section “LSB detail display”)

blank page!


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 1 V4.2 C: 0
GEBER-INFO: keine! 38400 bps 22ms K: 0
GRUPPE 0
ZE 0
M:01-100 SW4.2 ZE
M:02-000 SW4.2!EA
M:03-000 SW4.2!EA
M:04-000 SW4.2!EA
M:05-000 SW4.2!EA
M:06-000 SW4.2!EA
S:07 SW4.0!DK
S:08 SW4.0!DK
S:09 SW4.0!DK
S:10 SW4.0!DK
S:11 SW9.9 IA
S:12 SW9.9 IA
S:16 SW9.9 NG
S:17 SW9.9 DK
S:18 SW9.9 DK
S:19 SW9.9 DK
S:20 SW9.9 DK
S:21 SW4.0!LG
S:22 SW9.9 LG
S:23 SW4.0!LG
S:24 SW4.0!LG
S:25 SW9.9 DR
DOKUM/ INFO
SOFTWARE- DOWNLOAD
LSB-RESET AUTOMATIK
GRP/ZE
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 1 V4.2 C: 0
GEBER-INFO: keine! 38400 bps 22ms K: 0
GRUPPE 0
ZE 0
ADRESSE BESCHREIBUNG
=> 1 ZE0 DW1. 51
2 E/A-Modul 1 DW1. 52
3 E/A-Modul 2 DW1. 53
4 E/A-Modul 3 DW1. 54
5 E/A-Modul 4 DW1. 55
6 E/A-Modul 5 DW1. 56
7 o Druckgeber 1 Diagnoseprogramme DW1. 87
8 o Druckgeber 2 Diagnoseprogramme DW1. 90
9 o Druckgeber 3 Diagnoseprogramme DW1. 93
10 o Druckgeber 4 Diagnoseprogramme DW1. 96
11 Ballast ausgefahren (rechts) QW0. 82
12 Ballast eingefahren (rechts) QW0. 84
16 Neigungsgeber Kran DW1. 70
17 Druckgeber Abstuetzung HiRe1 [bar/10] DW1. 75
18 Druckgeber Abstuetzung VoRe2 [bar/10] DW1. 78
19 Druckgeber Abstuetzung VoLi3 [bar/10] DW1. 81
GRAFIK/ INFO
=> ADR ZUWEISEN
GRP/ZE
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

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1.4.2 Documentary LSB overview

The documentary LSB overview is called up using the function key **F1** (**DOCUM**).

Information

ADDRESS	• Bus address
DESCRIPTION	• Description of the LSB station in documentary form
OPERAND	
OPTION	• Customer request

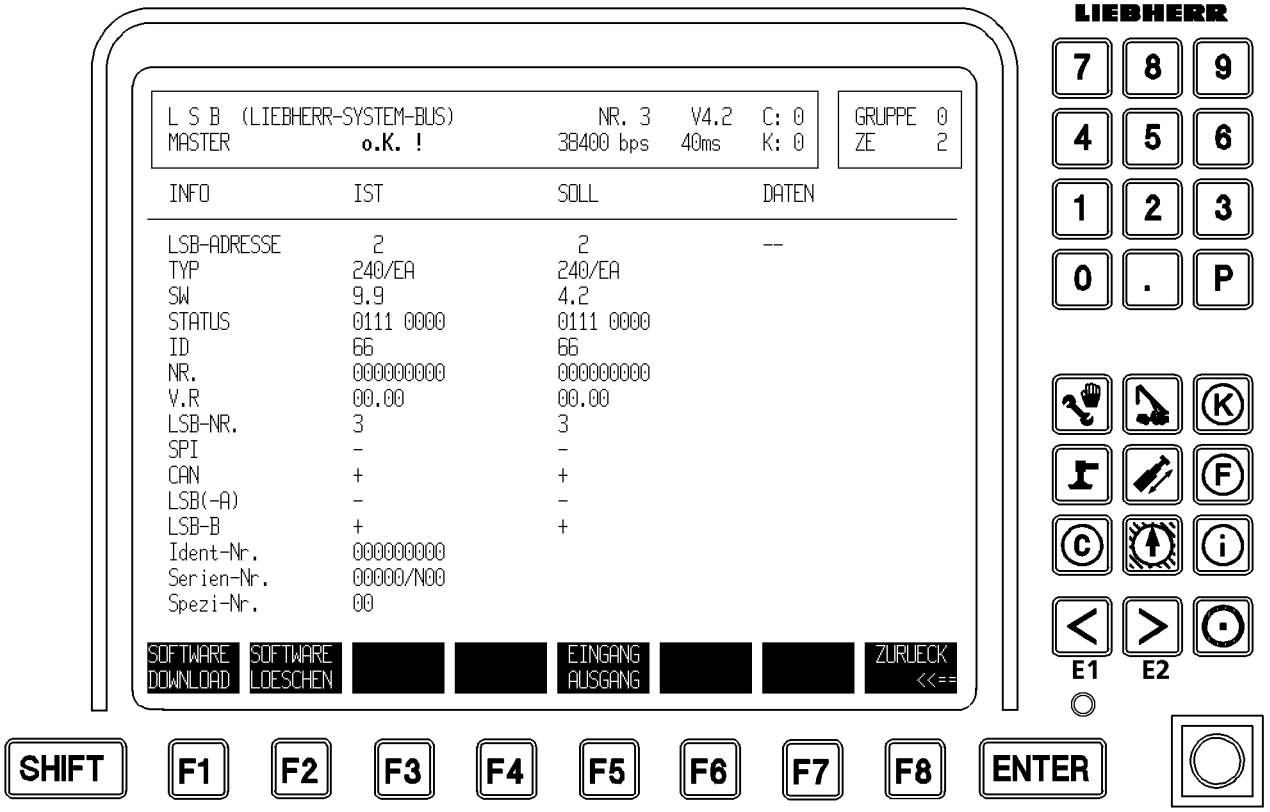
Function key line

F1 GRAFIC / INFO	• Back to grafic overview
F2 v	• Select station
F3 ^	• Select station
F4 ASSIGN ADDR	• Semiautomatic LSB sensor programming Sensor will be programmed from Address 0 at the target location (see section “Procedure for LSB sensor programming”)
F6 v	• Scroll to next page
F7 GRP / CPU	• Select desired Group or CPU Use the numeric keys to select the desired GROUP or CPU from the installed units
F8 BACK	• Back towards “Main menu”

Calling up individual LSB stations

- Select individual LSB stations using the function keys described.
- Press **ENTER** key.

Result: Selected LSB station will be displayed (see section “LSB detail display”)


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 3 V4.2 C: 0
MASTER o.K. ! 38400 bps 40ms K: 0
GRUPPE 0
ZE 2
INFO IST SOLL DATEN
LSB-ADRESSE 2 2 --
TYP 240/EA 240/EA
SW 9.9 4.2
STATUS 0111 0000 0111 0000
ID 66 66
NR. 000000000 000000000
V.R 00.00 00.00
LSB-NR. 3 3
SPI - -
CAN + +
LSB(-A) - -
LSB-B + +
Ident-Nr. 000000000
Serien-Nr. 00000/N00
Spezi-Nr. 00
SOFTWARE DOWNLOAD
SOFTWARE LOESCHEN
EINGANG AUSGANG
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

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1.5 LSB detail display master

1.5.1 I/O module

Information

The detail display displays the actual/setpoint value comparison of the type identifier:

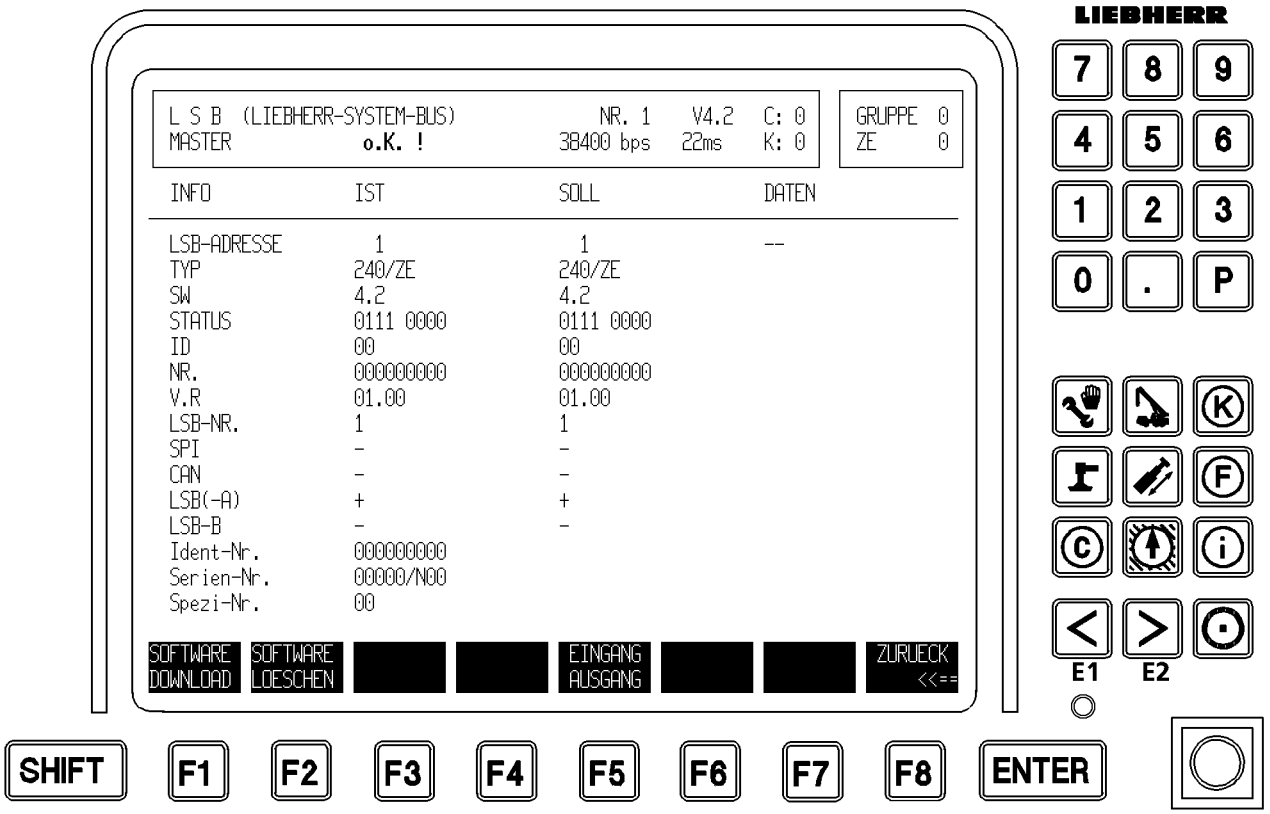
LSB-ADDRESS	• Address on the bus at which a sensor is addressed Each station must have a unique address.
TYPE	• Type identifier Each station on the bus is identified by a type identifier. These type identifiers are preprogrammed in the sensor by the manufacturer. **240** Master station (CPU or I/O module)
SW	• Version number of the sensor firmware Only stations with an identical or higher software version than the required input are compatible with each other.
STATUS	• Operating state of the station in compressed form (see “Hoist limit switch with wind sensor” in the section “LSB detail display slave”)
ID	• Additional identification number Unique identification of the station for programmed procedures
NR.	• Device number of the crane Must be the same for all master stations attached to a bus. When the LSB runs up, the system will check whether all components have the same number.
V.R	• Version number of the overall application which is programmed on the I/O module
LSB-NR.	• Displays which bus the I/O module is attached to There can be several busses when there are several CPUs. This will be indicated using consecutive numbering.
SPI	• Characteristic numeral showing which serial operating device is attached to the I/O module • There are three different characteristic numerals: • 1 = driver's cab keypad unit • 2 = driver's cab display unit • 3 = support control unit
CAN	• + = further components are connected on the I/O module • - = no CAN bus active
LSB-A	• + = LSB-A is active on the I/O module • - = no LSB-A active
LSB-B	• + = LSB-B is active on the I/O module • - = no LSB-B active
Ident-no.	• Programmed ID number of the LSB station
Serial no.	• Programmed serial number of the LSB station
Speci no.	• Programmed specification number of the LSB station

Data

No data will be displayed with the I/O module or the CPU since these exchange larger-sized data blocks with each other. The contents of these data blocks cannot be read by the user.

Function key line

F5 INPUT OUTPUT	• Call-up of sub-function Input / Output I/O module x (see relevant section)
F8 BACK	• Back towards “Main menu”


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 1 V4.2 C: 0
MASTER o.K. ! 38400 bps 22ms K: 0
GRUPPE 0
ZE 0
INFO IST SOLL DATEN
LSB-ADRESSE 1 1 --
TYP 240/ZE 240/ZE
SW 4.2 4.2
STATUS 0111 0000 0111 0000
ID 00 00
NR. 000000000 000000000
V.R 01.00 01.00
LSB-NR. 1 1
SPI - -
CAN - -
LSB(-A) + +
LSB-B - -
Ident-Nr. 000000000
Serien-Nr. 00000/N00
Spezi-Nr. 00
SOFTWARE DOWNLOAD
SOFTWARE LOESCHEN
EINGANG AUSGANG
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

B194941

1.5.2 Central processing unit (CPU)

Information

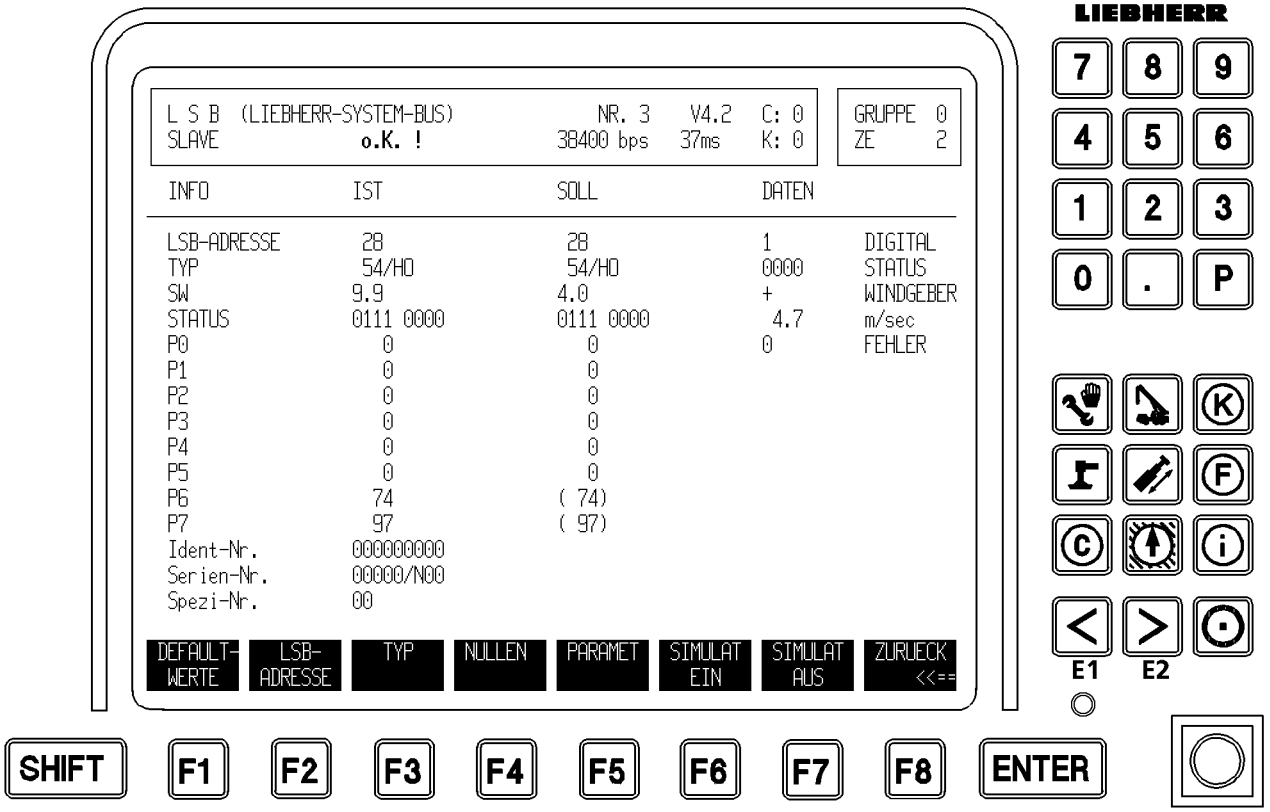
The actual/setpoint value of the type identifier will be displayed in the detail display (see “I/O module” in section “LSB detail display master”)

Data

No data will be displayed with the I/O module or the CPU since these exchange larger-sized data blocks with each other. The contents of these data blocks cannot be read by the user.

Function key line

see “I/O module” in section “LSB detail display master”.


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 3 V4.2 C: 0
SLAVE o.K. ! 38400 bps 37ms K: 0
GRUPPE 0
ZE 2
INFO IST SOLL DATEN
LSB-ADRESSE 28 28 1 DIGITAL
TYP 54/HO 54/HO 0000 STATUS
SW 9.9 4.0 + WINDGEBER
STATUS 0111 0000 0111 0000 4.7 m/sec
P0 0 0 0 FEHLER
P1 0 0
P2 0 0
P3 0 0
P4 0 0
P5 0 0
P6 74 (74)
P7 97 (97)
Ident-Nr. 000000000
Serien-Nr. 00000/N00
Spezi-Nr. 00
DEFAULT-WERTE
LSB-ADRESSE
TYP
NULLEN
PARAMET
SIMULAT EIN
SIMULAT AUS
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

B194942

1.6 LSB detail display slave

1.6.1 Hoist limit switch with winch sensor (HO)

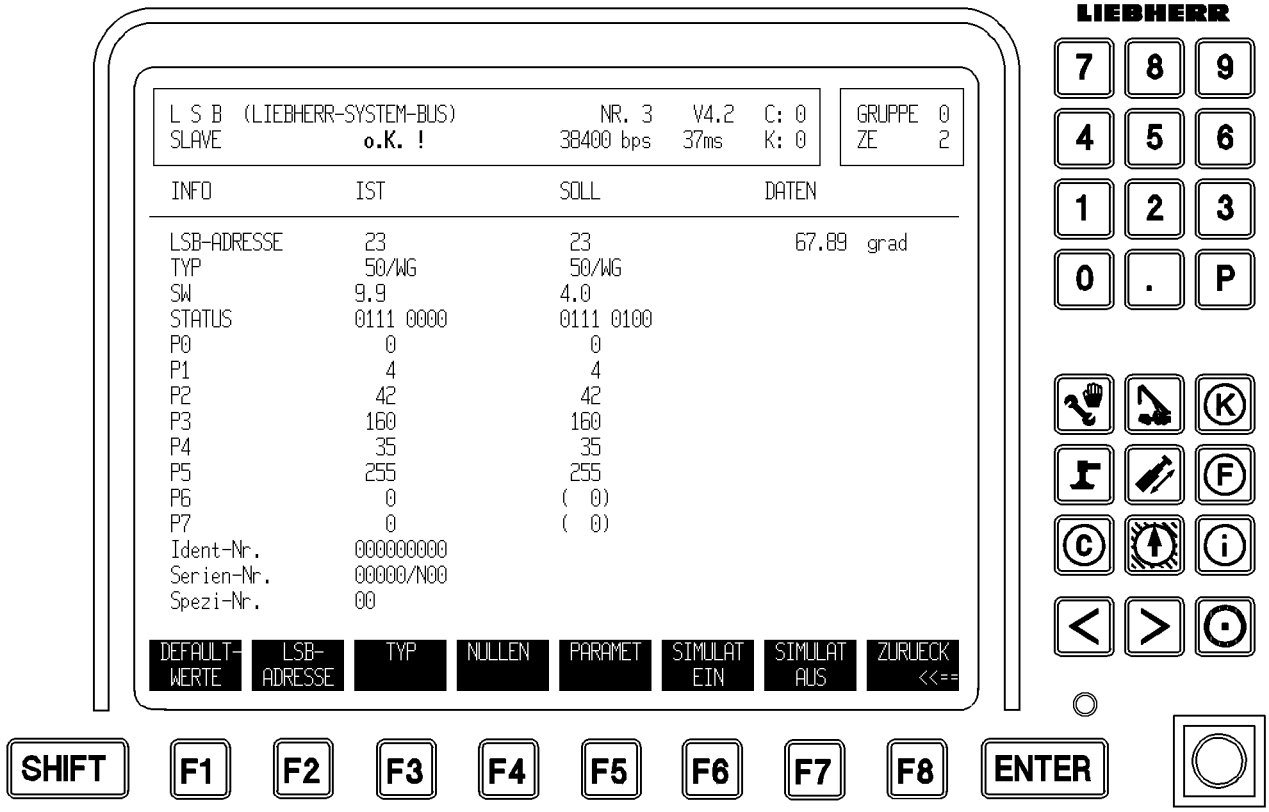
Information

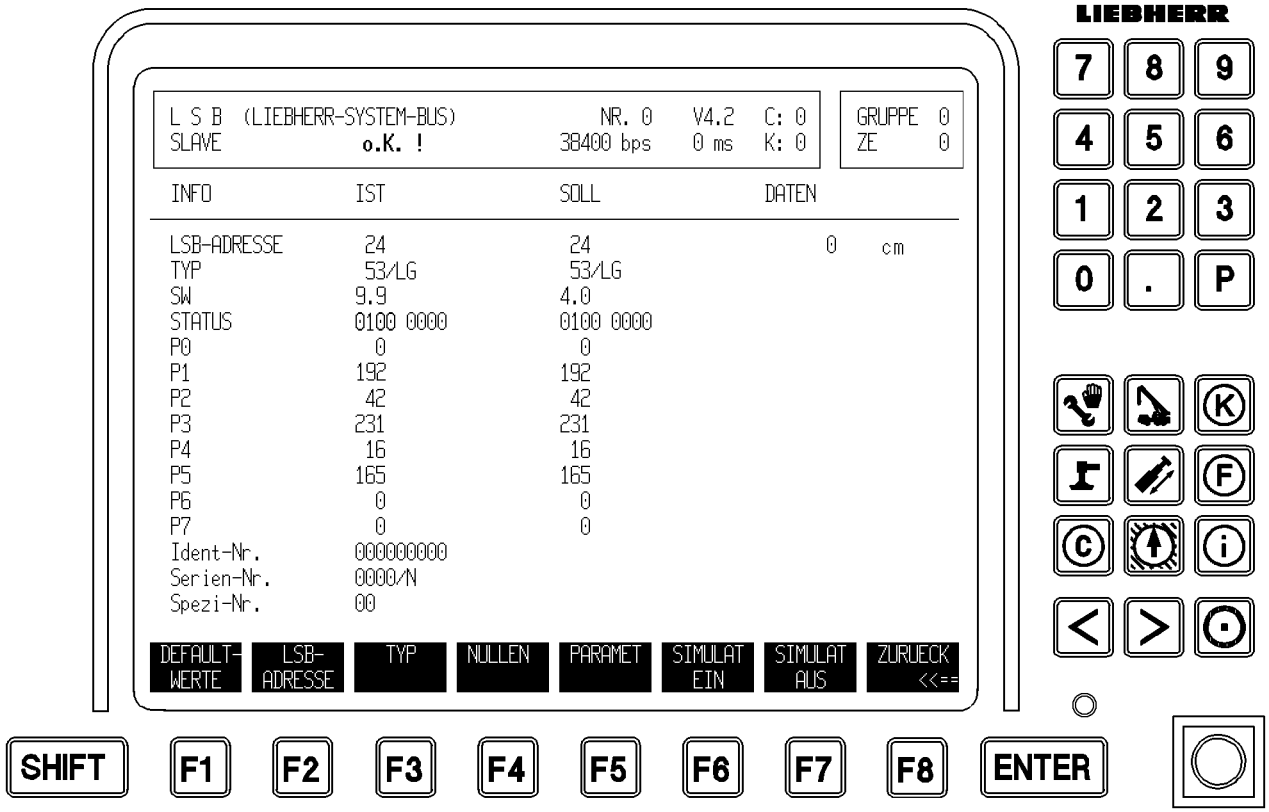
The detail display displays the actual/setpoint value comparison of the type identifier.

LSB-ADDRESS
- Address on the bus at which a sensor is addressed
  Each station must have a unique address.

TYPE
- Type identifier
  Each station on the bus is identified by a type identifier.
- These type identifiers are preprogrammed in the sensor by the manufacturer:
  - 01 Inductive sensor / digital (ID)
  - 49 Inductive sensor / analog (IA)
  - 50 Angle sensor (AS)
  - 51 Pressure sensor (PS)
  - 55 Inclination sensor (IS)
  - 53 Length sensor (LS)
  - 54 Hoist top / wind sensor (HO)
  - 56 Shaft encoder (SE)
  - 59 Tension measuring lug (TM)
  - 74 Master switch (MS)
  - 76 Pedal sensor (foot rocker) (PS)

SW
- Version number of the sensor firmware
  Only stations with an identical or higher software version than the required input are compatible with each other.


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 3 V4.2 C: 0
SLAVE o.K. ! 38400 bps 37ms K: 0
GRUPPE 0
ZE 2
INFO IST SOLL DATEN
LSB-ADRESSE 23 23 67.89 grad
TYP 50/WG 50/WG
SW 9.9 4.0
STATUS 0111 0000 0111 0100
P0 0 0
P1 4 4
P2 42 42
P3 160 160
P4 35 35
P5 255 255
P6 0 (0)
P7 0 (0)
Ident-Nr. 000000000
Serien-Nr. 00000/N00
Spezi-Nr. 00
DEFAULT-WERTE
LSB-ADRESSE
TYP
NULLEN
PARAMET
SIMULAT EIN
SIMULAT AUS
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 0 V4.2 C: 0
SLAVE o.K. ! 38400 bps 0 ms K: 0
GRUPPE 0
ZE 0
INFO IST SOLL DATEN
LSB-ADRESSE 24 24 0 cm
TYP 53/LG 53/LG
SW 9.9 4.0
STATUS 0100 0000 0100 0000
P0 0 0
P1 192 192
P2 42 42
P3 231 231
P4 16 16
P5 165 165
P6 0 0
P7 0 0
Ident-Nr. 000000000
Serien-Nr. 0000/N
Spezi-Nr. 00
DEFAULT-WERTE
LSB-ADRESSE
TYP
NULLEN
PARAMET
SIMULAT EIN
SIMULAT AUS
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

B194943

1.6.2 Angle sensor (AS)

Information

The actual/setpoint value of the type identifier will be displayed in the detail display (see “Hoist limit switch with wind sensor” in section “LSB detail display slave”)

Data

degrees • Main boom angle to the horizontal in degrees

Function key line

see “Hoist limit switch with wind sensor” in section “LSB detail display slave”

1.6.3 Length sensor (LS)

Information

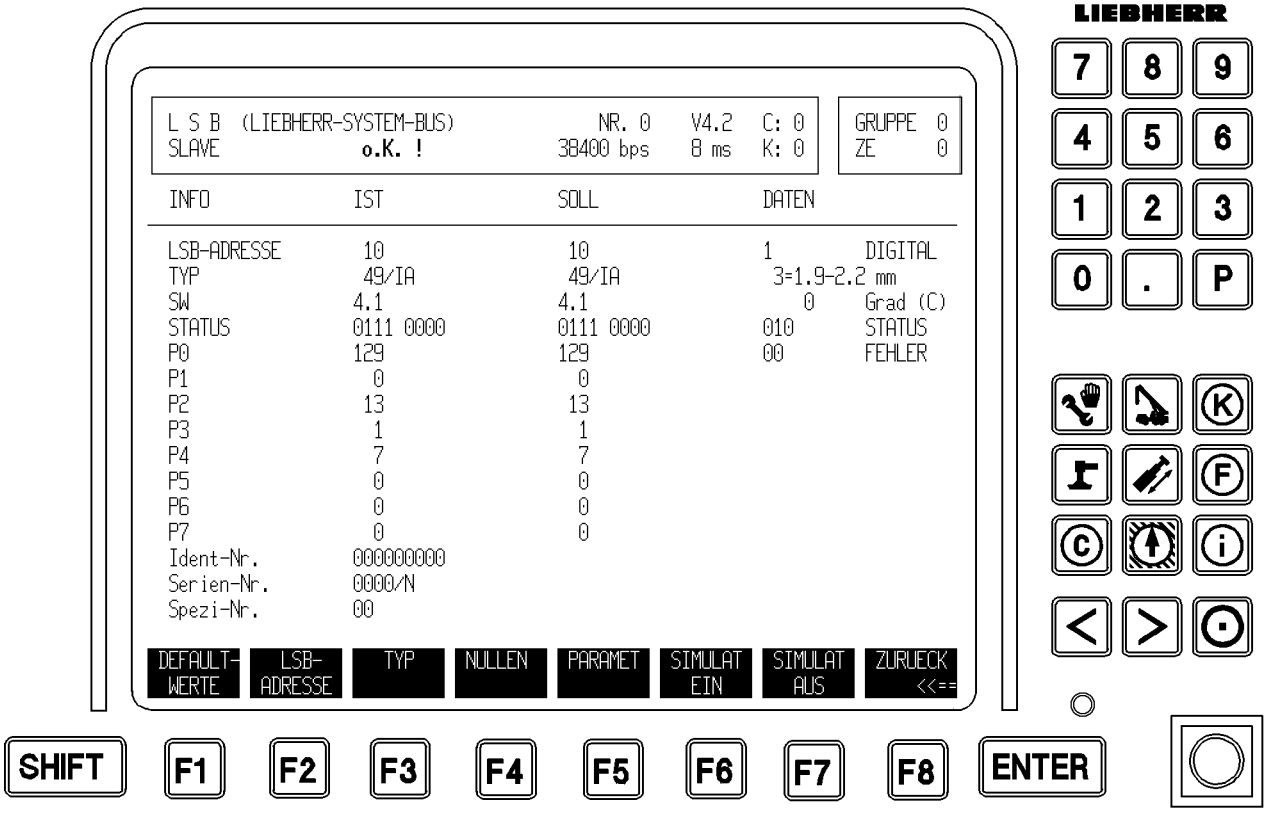
The actual/setpoint value of the type identifier will be displayed in the detail display (see “Hoist limit switch with wind sensor” in section “LSB detail display slave”)

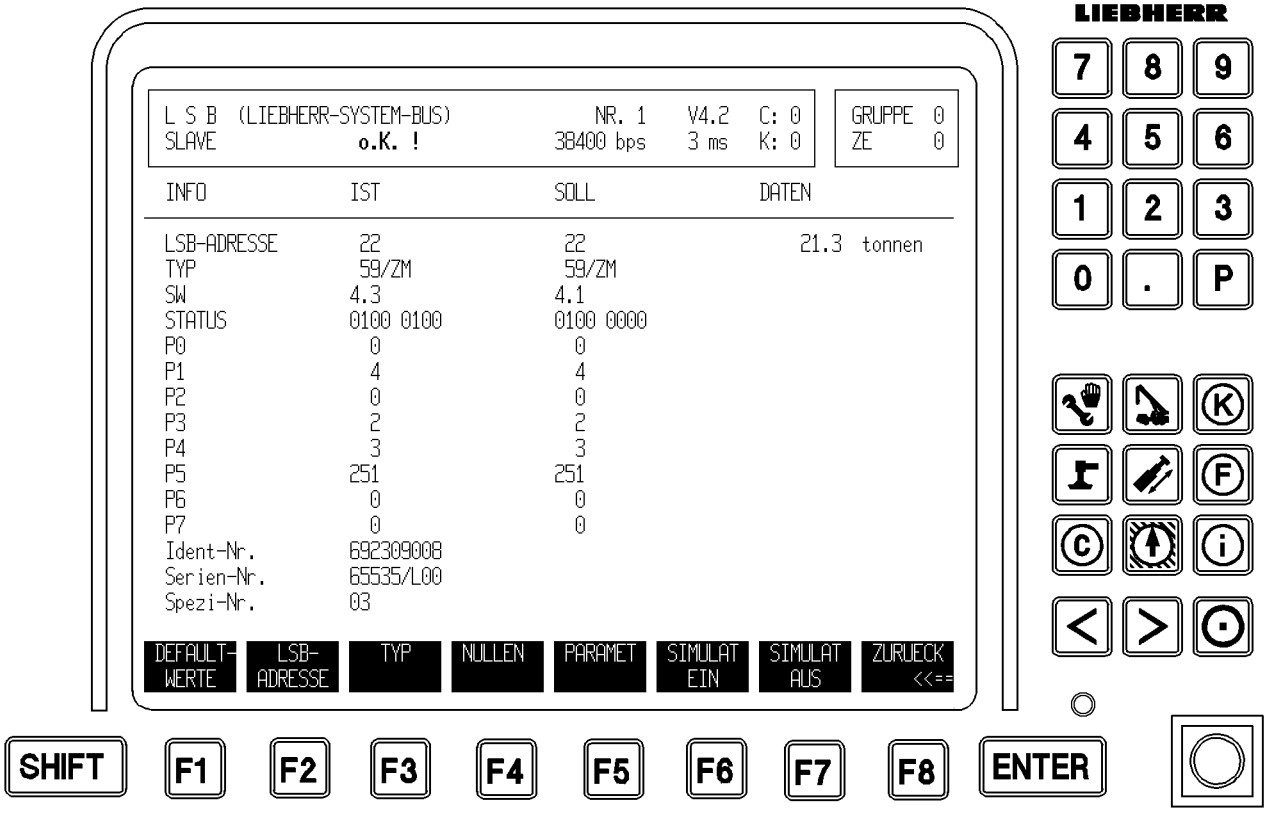
Data

cm • Main boom angle to the horizontal in cm

Function key line

see “Hoist limit switch with wind sensor” in section “LSB detail display slave”


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 0 V4.2 C: 0
SLAVE o.K. ! 38400 bps 8 ms K: 0
GRUPPE 0
ZE 0
INFO IST SOLL DATEN
LSB-ADRESSE 10 10 1 DIGITAL
TYP 49/IA 49/IA 3=1.9-2.2 mm
SW 4.1 4.1 0 Grad (C)
STATUS 0111 0000 0111 0000 010 STATUS
P0 129 129 00 FEHLER
P1 0 0
P2 13 13
P3 1 1
P4 7 7
P5 0 0
P6 0 0
P7 0 0
Ident-Nr. 000000000
Serien-Nr. 0000/N
Spezi-Nr. 00
DEFAULT-WERTE
LSB-ADRESSE
TYP
NULLEN
PARAMET
SIMULAT EIN
SIMULAT AUS
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 1 V4.2 C: 0
SLAVE o.K. ! 38400 bps 3 ms K: 0
GRUPPE 0
ZE 0
INFO IST SOLL DATEN
LSB-ADRESSE 22 22 21.3 tonnen
TYP 59/ZM 59/ZM
SW 4.3 4.1
STATUS 0100 0100 0100 0000
P0 0 0
P1 4 4
P2 0 0
P3 2 2
P4 3 3
P5 251 251
P6 0 0
P7 0 0
Ident-Nr. 692309008
Serien-Nr. 65535/L00
Spezi-Nr. 03
DEFAULT-WERTE
LSB-ADRESSE
TYP
NULLEN
PARAMET
SIMULAT EIN
SIMULAT AUS
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

B194944

1.6.4 Inductive sensor / analog (IA)

Information

The actual/setpoint value of the type identifier will be displayed in the detail display (see “Hoist limit switch with wind sensor” in section “LSB detail display slave”)

Data

DIGITAL	• Digital switching information 0 or 1
mm	• Analog value of sensor (3 here), corresponds to the distance 1.9 - 2.2 mm.
DEGREES (C)	• Temperature sensor in °C
STATUS	• Current position of reed contact from which the switching information has been derived
ERROR	• Displays whether the measurement is OK

Function key line

see “Hoist limit switch with wind sensor” in section “LSB detail display slave”

1.6.5 Tension measuring lug (TM)

Information

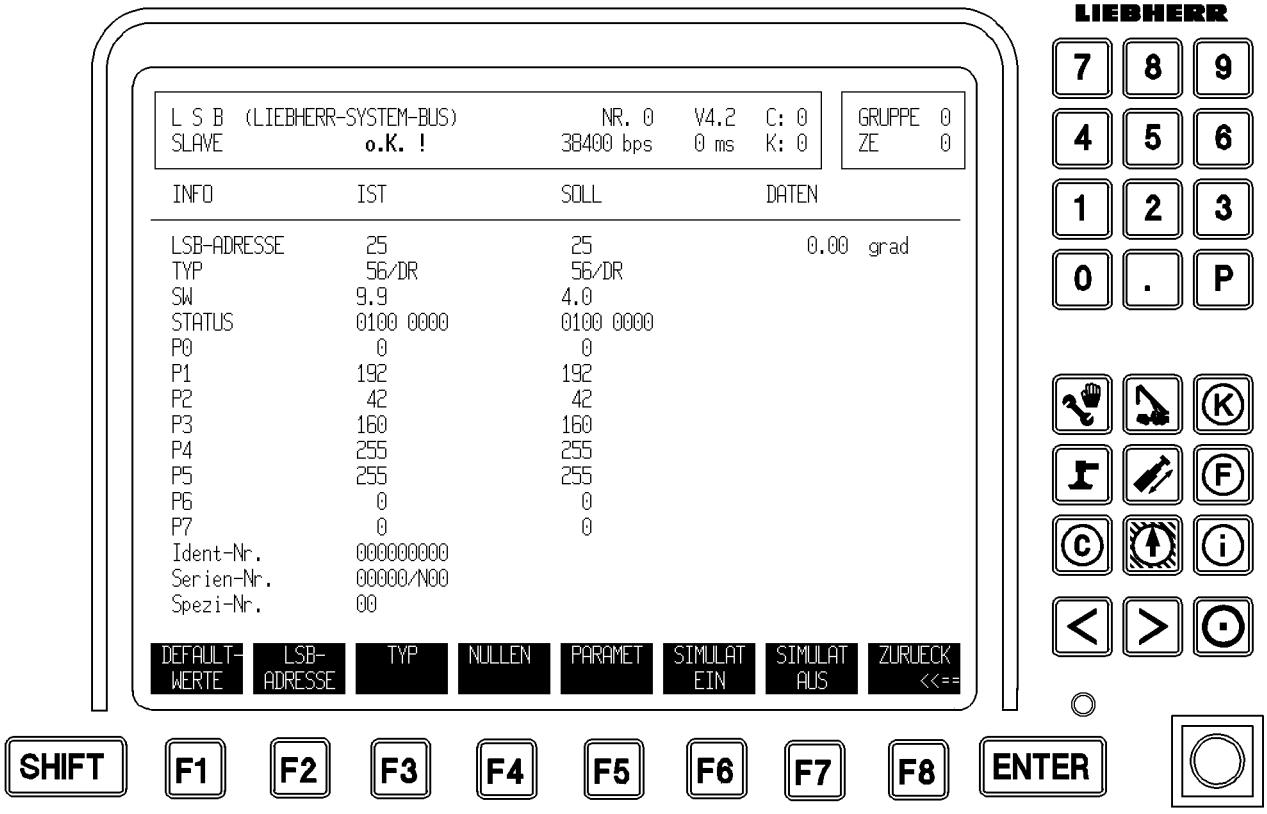
The actual/setpoint value of the type identifier will be displayed in the detail display (see “Hoist limit switch with wind sensor” in section “LSB detail display slave”)

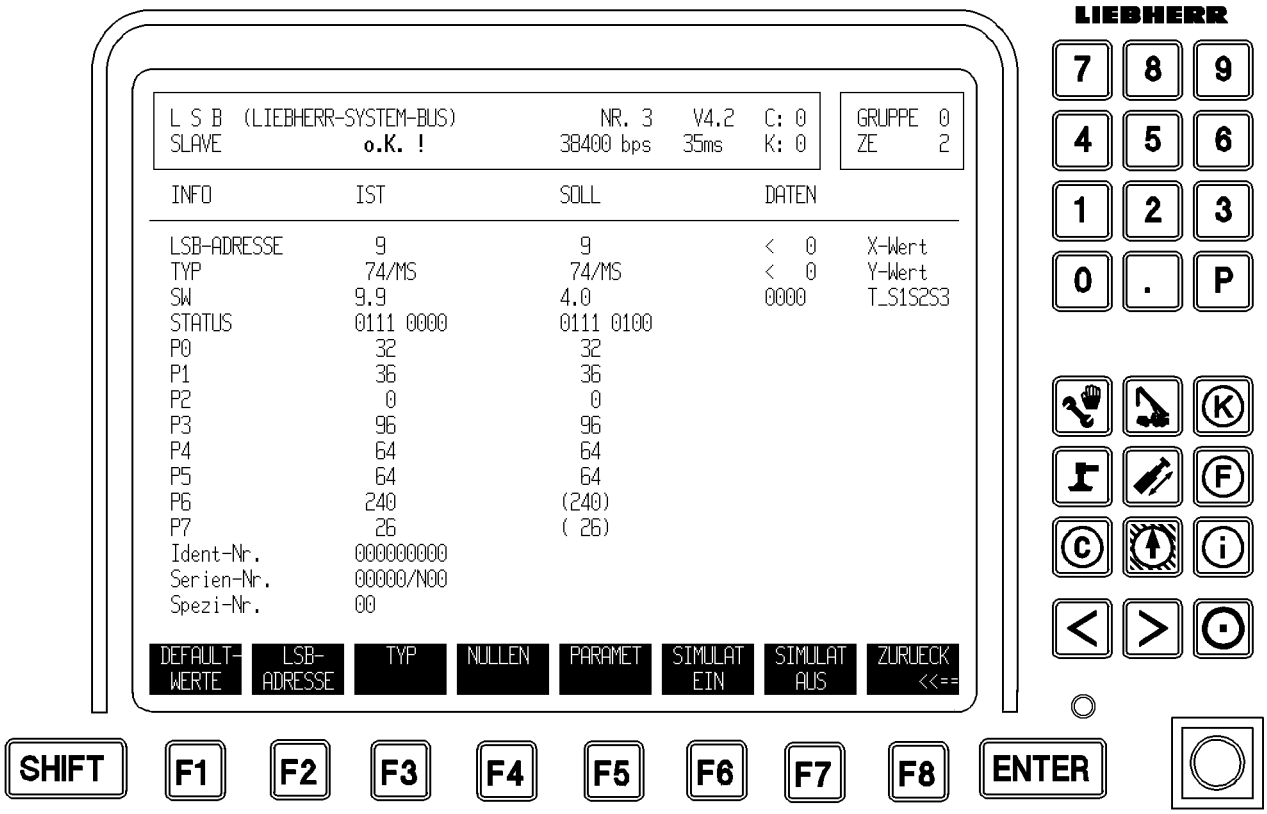
Data

tonnes	• Current tensile force in t

Function key line

see “Hoist limit switch with wind sensor” in section “LSB detail display slave”


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 0 V4.2 C: 0
SLAVE o.K. ! 38400 bps 0 ms K: 0
GRUPPE 0
ZE 0
INFO IST SOLL DATEN
LSB-ADRESSE 25 25 0.00 grad
TYP 56/DR 56/DR
SW 9.9 4.0
STATUS 0100 0000 0100 0000
P0 0 0
P1 192 192
P2 42 42
P3 160 160
P4 255 255
P5 255 255
P6 0 0
P7 0 0
Ident-Nr. 000000000
Serien-Nr. 00000/N00
Spezi-Nr. 00
DEFAULT-WERTE
LSB-ADRESSE
TYP
NULLEN
PARAMET
SIMULAT EIN
SIMULAT AUS
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 3 V4.2 C: 0
SLAVE o.K. ! 38400 bps 35ms K: 0
GRUPPE 0
ZE 2
INFO IST SOLL DATEN
LSB-ADRESSE 9 9 < 0 X-Wert
TYP 74/MS 74/MS < 0 Y-Wert
SW 9.9 4.0 0000 T_S1S2S3
STATUS 0111 0000 0111 0100
P0 32 32
P1 36 36
P2 0 0
P3 96 96
P4 64 64
P5 64 64
P6 240 (240)
P7 26 (26)
Ident-Nr. 000000000
Serien-Nr. 00000/N00
Spezi-Nr. 00
DEFAULT-WERTE
LSB-ADRESSE
TYP
NULLEN
PARAMET
SIMULAT EIN
SIMULAT AUS
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

B194945

1.6.6 Shaft encoder horizontal (SE)

Information

The actual/setpoint value of the type identifier will be displayed in the detail display (see “Hoist limit switch with wind sensor” in section “LSB detail display slave”)

Data

degrees	• Current position of crane superstructure related to the main work direction “to the rear” in degrees

Function key line

see “Hoist limit switch with wind sensor” in section “LSB detail display slave”

1.6.7 Master switch (MS)

Information

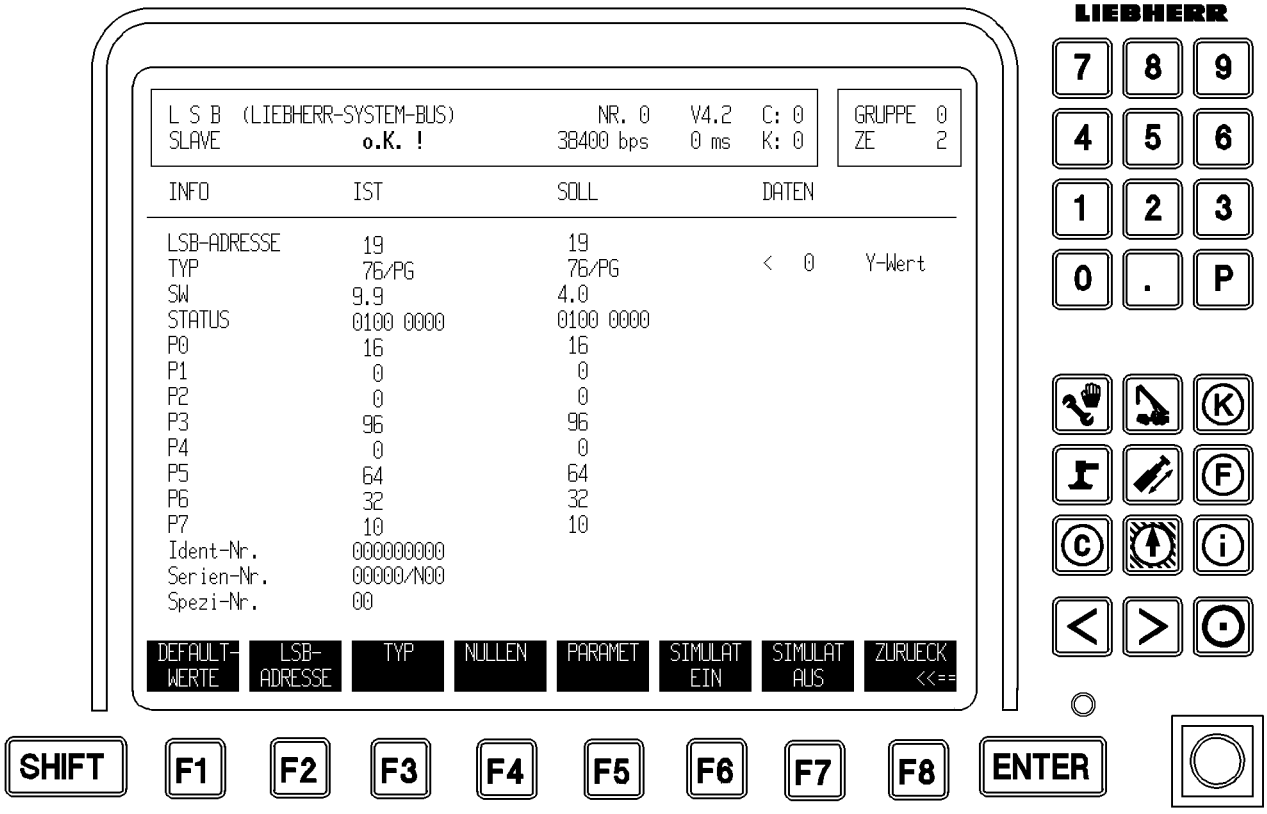
The actual/setpoint value of the type identifier will be displayed in the detail display (see “Hoist limit switch with wind sensor” in section “LSB detail display slave”)

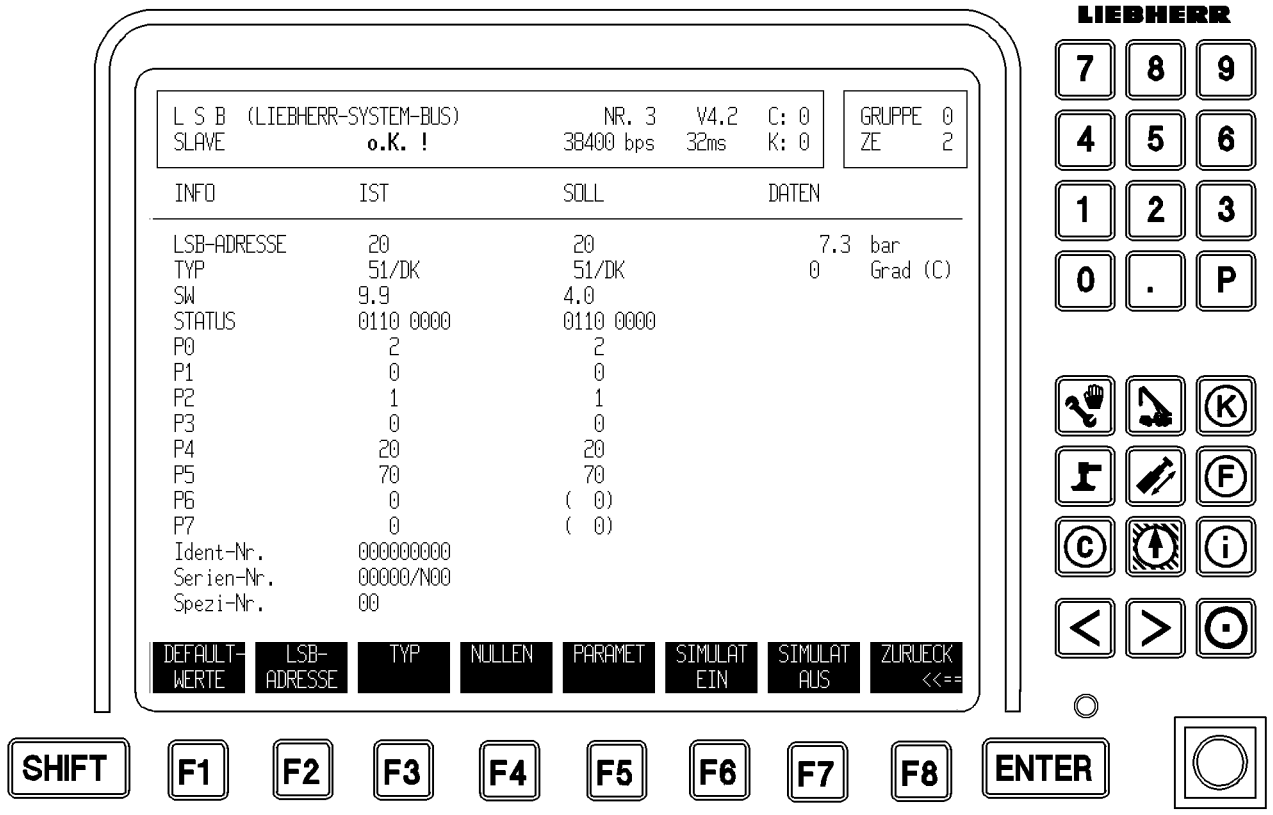
Data

<0	• **X-value** Excursion in X-direction in %
<0	• **Y-value** Excursion in Y-direction in %
0000	• **T_S1S2S3** Keypad assignment on master switch

Function key line

see “Hoist limit switch with wind sensor” in section “LSB detail display slave”


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 0 V4.2 C: 0
SLAVE o.K. ! 38400 bps 0 ms K: 0
GRUPPE 0
ZE 2
INFO IST SOLL DATEN
LSB-ADRESSE 19 19
TYP 76/PG 76/PG < 0 Y-Wert
SW 9.9 4.0
STATUS 0100 0000 0100 0000
P0 16 16
P1 0 0
P2 0 0
P3 96 96
P4 0 0
P5 64 64
P6 32 32
P7 10 10
Ident-Nr. 000000000
Serien-Nr. 00000/N00
Spezi-Nr. 00
DEFAULT-WERTE
LSB-ADRESSE
TYP
NULLEN
PARAMET
SIMULAT EIN
SIMULAT AUS
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 3 V4.2 C: 0
SLAVE o.K. ! 38400 bps 32ms K: 0
GRUPPE 0
ZE 2
INFO IST SOLL DATEN
LSB-ADRESSE 20 20 7.3 bar
TYP 51/DK 51/DK 0 Grad (C)
SW 9.9 4.0
STATUS 0110 0000 0110 0000
P0 2 2
P1 0 0
P2 1 1
P3 0 0
P4 20 20
P5 70 70
P6 0 (0)
P7 0 (0)
Ident-Nr. 000000000
Serien-Nr. 00000/N00
Spezi-Nr. 00
DEFAULT-WERTE
LSB-ADRESSE
TYP
NULLEN
PARAMET
SIMULAT EIN
SIMULAT AUS
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

B194946

1.6.8 Pedal sensor (PS)

Information

The actual/setpoint value of the type identifier will be displayed in the detail display (see “Hoist limit switch with wind sensor” in section “LSB detail display slave”)

Data

<0	• **Y-value** Excursion in Y-direction in %

Function key line

see “Hoist limit switch with wind sensor” in section “LSB detail display slave”

1.6.9 Pressure sensor (PS)

Information

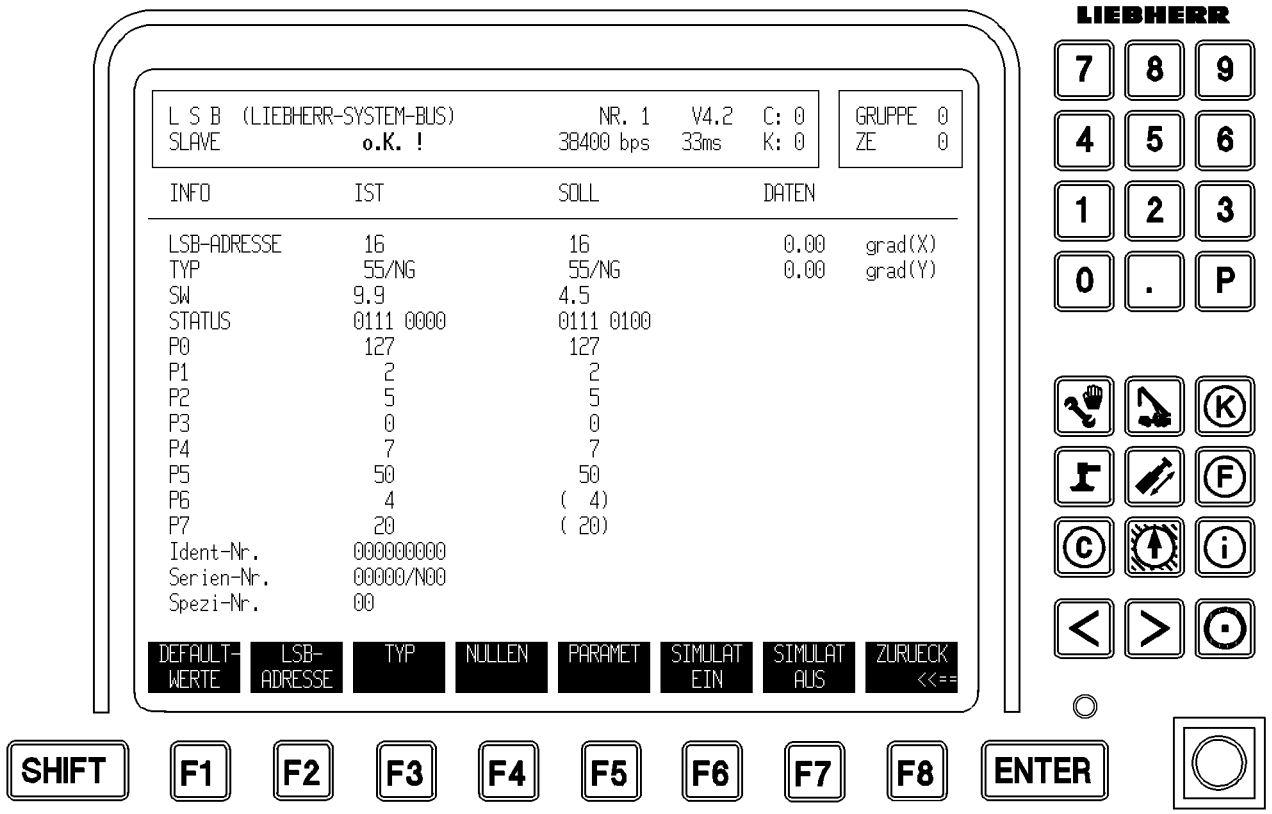
The actual/setpoint value of the type identifier will be displayed in the detail display (see “Hoist limit switch with wind sensor” in section “LSB detail display slave”)

Data

bar	• Pressure in bar
Degrees (C)	• Temperature sensor in °C

Function key line

see “Hoist limit switch with wind sensor” in section “LSB detail display slave”


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 1 V4.2 C: 0
SLAVE o.K. ! 38400 bps 33ms K: 0
GRUPPE 0
ZE 0
INFO IST SOLL DATEN
LSB-ADRESSE 16 16 0.00 grad(X)
TYP 55/NG 55/NG 0.00 grad(Y)
SW 9.9 4.5
STATUS 0111 0000 0111 0100
P0 127 127
P1 2 2
P2 5 5
P3 0 0
P4 7 7
P5 50 50
P6 4 (4)
P7 20 (20)
Ident-Nr. 000000000
Serien-Nr. 00000/N00
Spezi-Nr. 00
DEFAULT-WERTE
LSB-ADRESSE
TYP
NULLEN
PARAMET
SIMULAT EIN
SIMULAT AUS
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
SHIFT
F1 F2 F3 F4 F5 F6 F7 F8
ENTER

B194947

1.6.10 Inclination sensor (IS)

Information

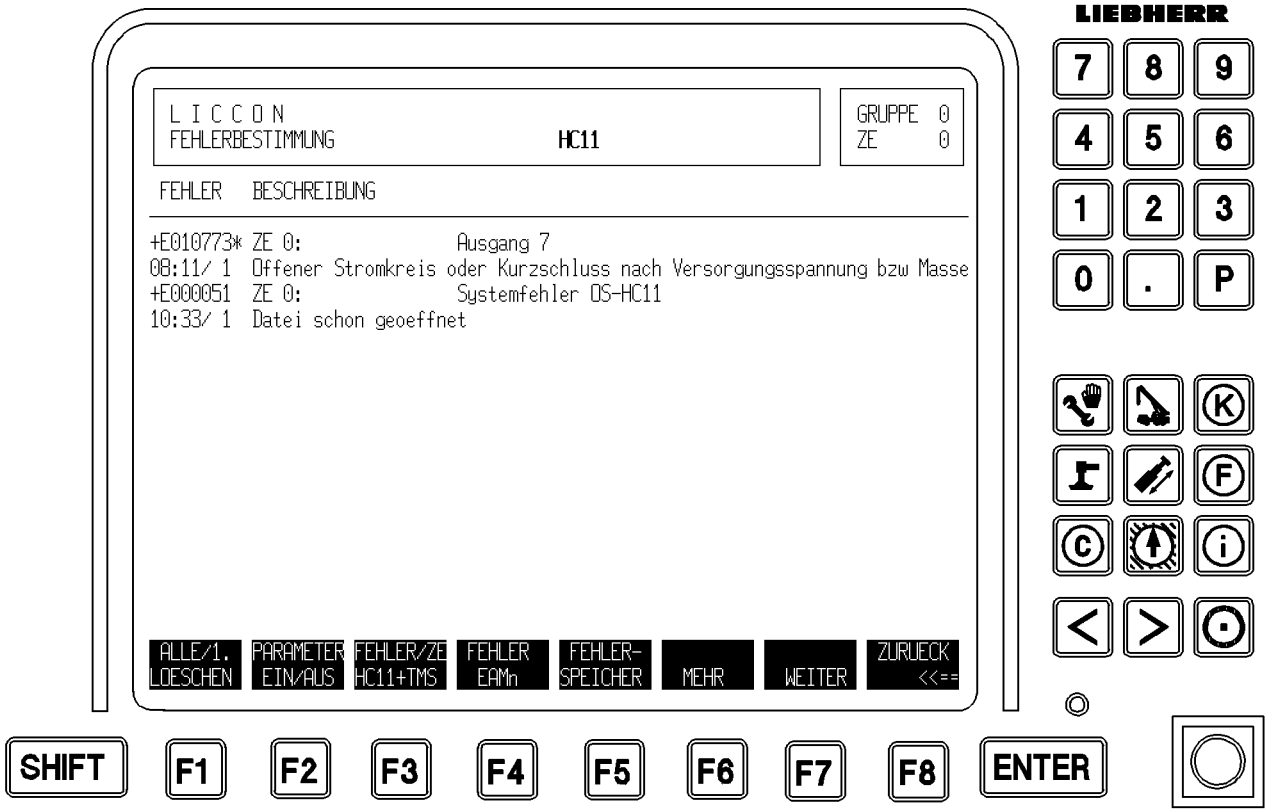
The actual/setpoint value of the type identifier will be displayed in the detail display (see “Hoist limit switch with wind sensor” in section “LSB detail display slave”)

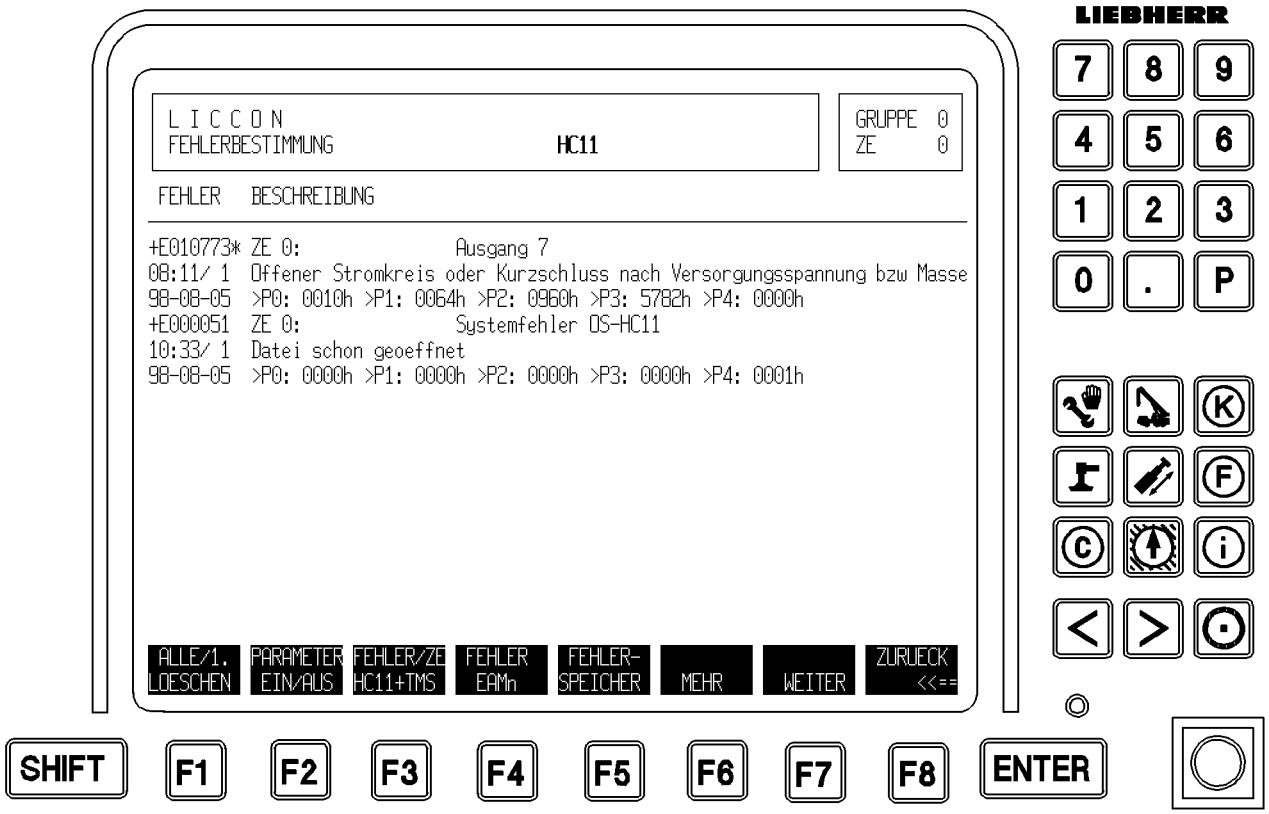
Data

degrees (X)	• Inclination of crane in X-direction in degrees
degrees (Y)	• Inclination of crane in Y-direction in degrees

Function key line

see “Hoist limit switch with wind sensor” in section “LSB detail display slave”


LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
HC11
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG
+E010773* ZE 0: Ausgang 7
08:11/ 1 Offener Stromkreis oder Kurzschluss nach Versorgungsspannung bzw Masse
+E000051 ZE 0: Systemfehler OS-HC11
10:33/ 1 Datei schon geoeffnet
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER-SPEICHER
MEHR
WEITER
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER


LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
HC11
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG
+E010773* ZE 0: Ausgang 7
08:11/ 1 Offener Stromkreis oder Kurzschluss nach Versorgungsspannung bzw Masse
98-08-05 >P0: 0010h >P1: 0064h >P2: 0960h >P3: 5782h >P4: 0000h
+E000051 ZE 0: Systemfehler OS-HC11
10:33/ 1 Datei schon geoeffnet
98-08-05 >P0: 0000h >P1: 0000h >P2: 0000h >P3: 0000h >P4: 0001h
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER-SPEICHER
MEHR
WEITER
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

B194970

1.7 LICCON error determination

Malfunctions in the LICCON computer system generate error messages. A distinction is made here between **operating errors** and **system errors** (see section “Error identification - LICCON computer system”).
System errors can also be subdivided here into:

– **Active system errors**
  Errors which occur persistently (Example: cable break, sensor defective, etc.)
  Identification using the sign “+”
– **Inactive system errors**
  Errors which only occur momentarily (Example: loose contact, temporary sensor failure, etc.)
  Identification using the sign “-”

1.7.1 Error vault

Each central processing unit possesses a processor HC11 and TMS. These processors each possess a memory area (error vault) in which up to 9 errors can be stored. In addition, each I/O module also possesses an error vault in which up to 9 errors can be stored. All errors which appear with the LICCON-Error-Code (LEC) are displayed together with their error number and stored and documented in the relevant error vault.

– If the error vault of one processor is full (9 errors), inactive errors will be overwritten by new active errors.
– If only active system errors are present in the error vault it is not possible to store any further system errors in the error vault.
– If the error vault is filled with active system errors, a system error will be overwritten if an operating error occurs.
– If an error is still present or the cause of error has not been rectified, a new active error message will be generated and displayed if the error occurs again, i.e. with a new date and time.

Caution!
Deleting errors in the error vault!
When the ignition is switched off, all error messages (active and inactive) are deleted in the error vaults.
! Be careful when switching off the ignition.

You will find information on storing errors in non-volatile error memories of the power unit in the section “Error memory”.

Determining errors from the program Operating, Telescoping, Configuration, Support

If there is a system error or operating error, an error message will appear in the symbol element “Horn” above the function key **F8**, for example **E:0HC11**.

- Press function key **F8**.

Result: Acoustic signal is switched off.

- Press function key **F8** again.

Result: Multi-CPU test system for error identification is called up.
Automatic change to error vault where the first error identified is stored.

Calling up the Multi-CPU test system

- Press program key **P8** (“i” -key).

Result: “Test system” program is called up.

- Select CPU in main menu.
- Press function key **F5**.

Result: Sub-function “Test + Error” is called up.

- Press function key **F5** again.

Result: Sub-function “Test” is called up.

- Press function key **F3**, function key **F4** or function key **F5**.

Result: Error vault HC11, TMS or IOMn is selected.

- If function key **F7** is pressed again:
  Each IOM error vault will be displayed.

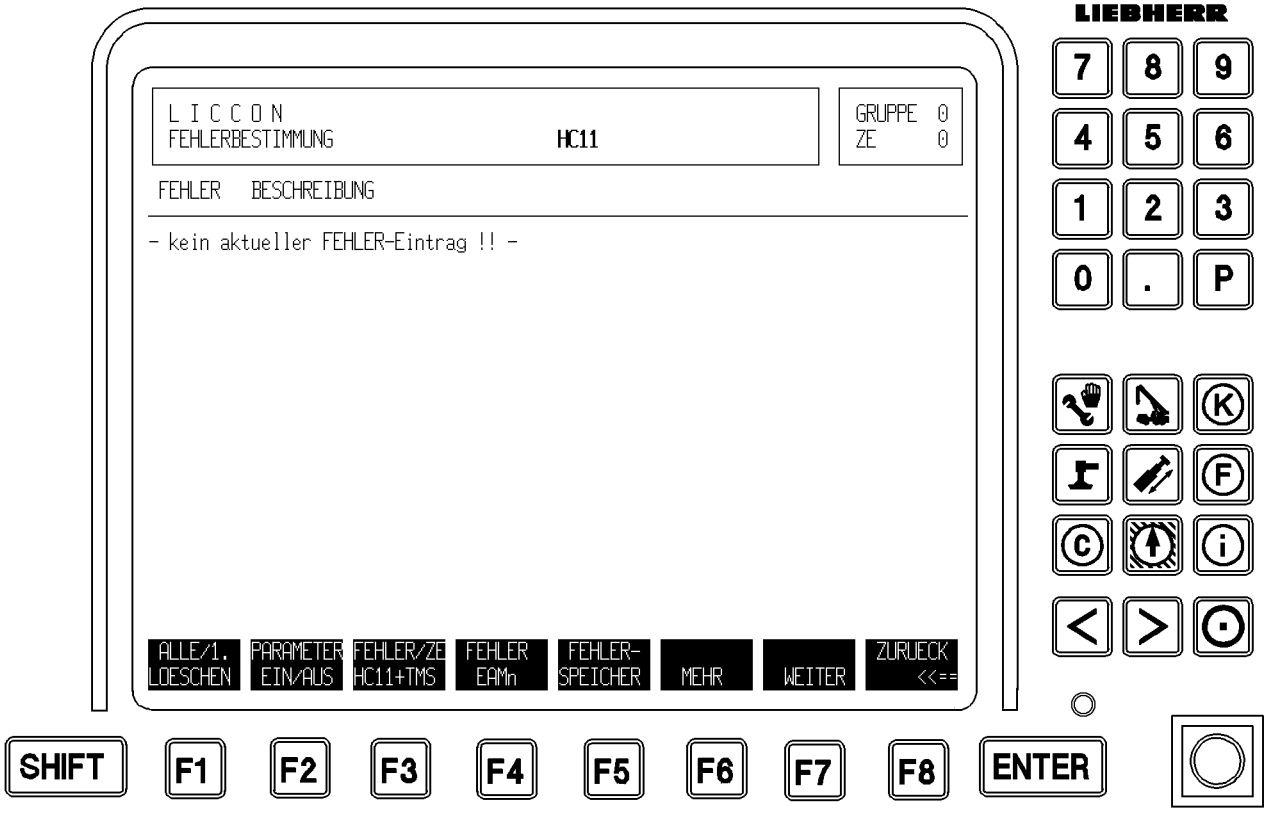
Information

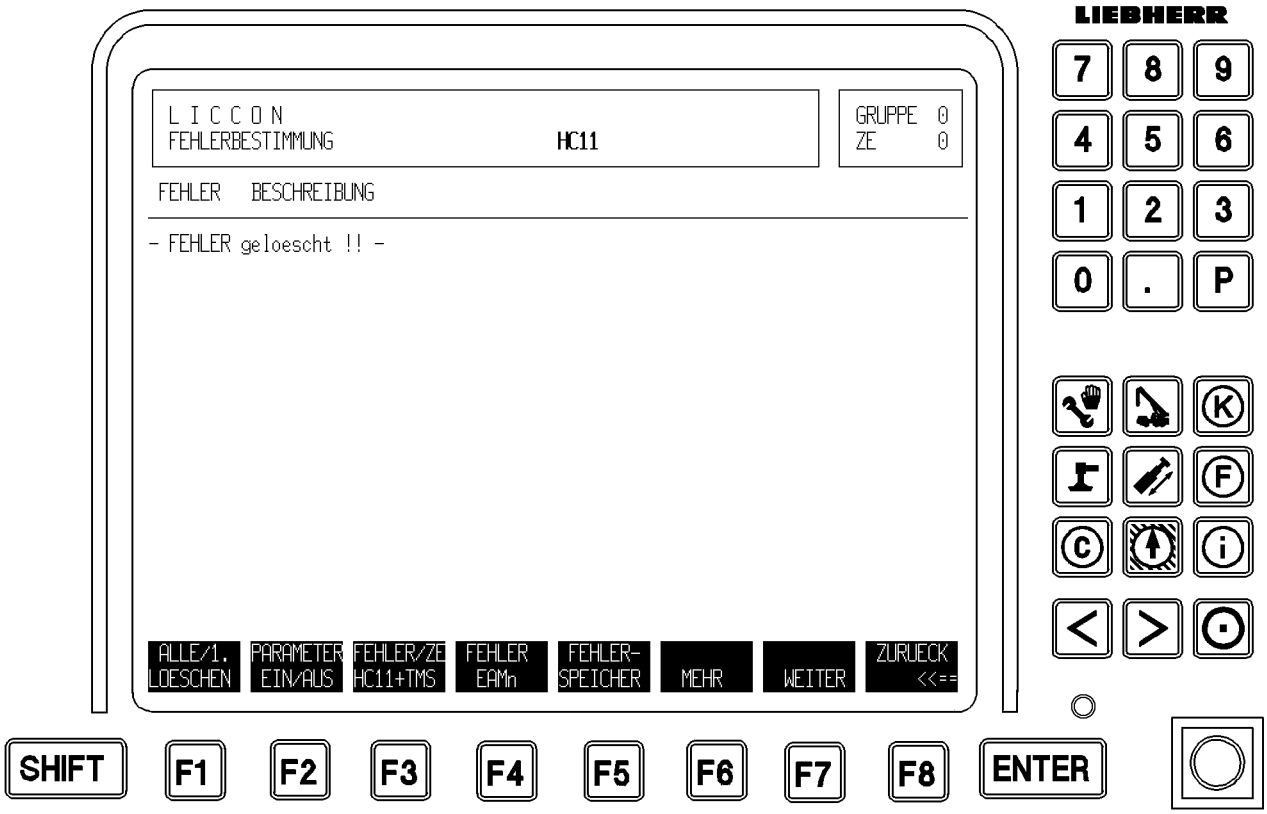
The information about an error is distributed over 2 lines. When the sub-function **PARAMETER ON** is called up using function key **F2** it is 3 lines. Here, the error-specific data and the date that the error occurred will be displayed in the third line. In addition, all errors which are no longer active will be displayed (inactive errors “-”).

Line	**Display**		
	Meaning		
1st line:	± LEC (*)	Device-Code	Error path
	+ = active error - = inactive error[1] LEC = LICCON-Error-Code * = 1. error on page1 of the selected error vault	Module generating error	Error source
2nd line:	Time/error frequency	Type of error	
	When error last appeared/how often error has occurred	Documentary description of error	
3rd line:[1]	Date	Error-specific data in hexadecimal form	

[1] When function “PARAMETER ON” is called up

blank page!


LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
HC11
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG
- kein aktueller FEHLER-Eintrag !! -
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER- SPEICHER
MEHR
WEITER
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

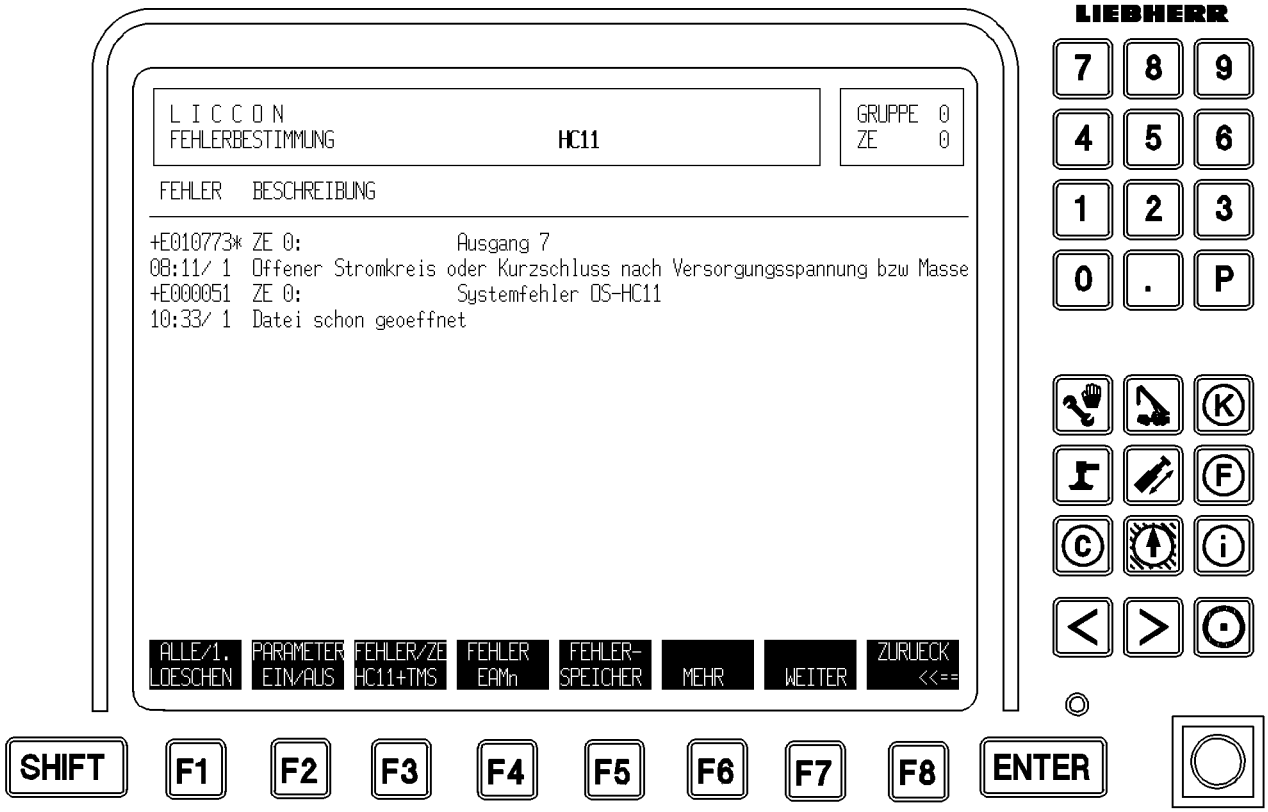

LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
HC11
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG
- FEHLER geloescht !! -
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER- SPEICHER
MEHR
WEITER
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

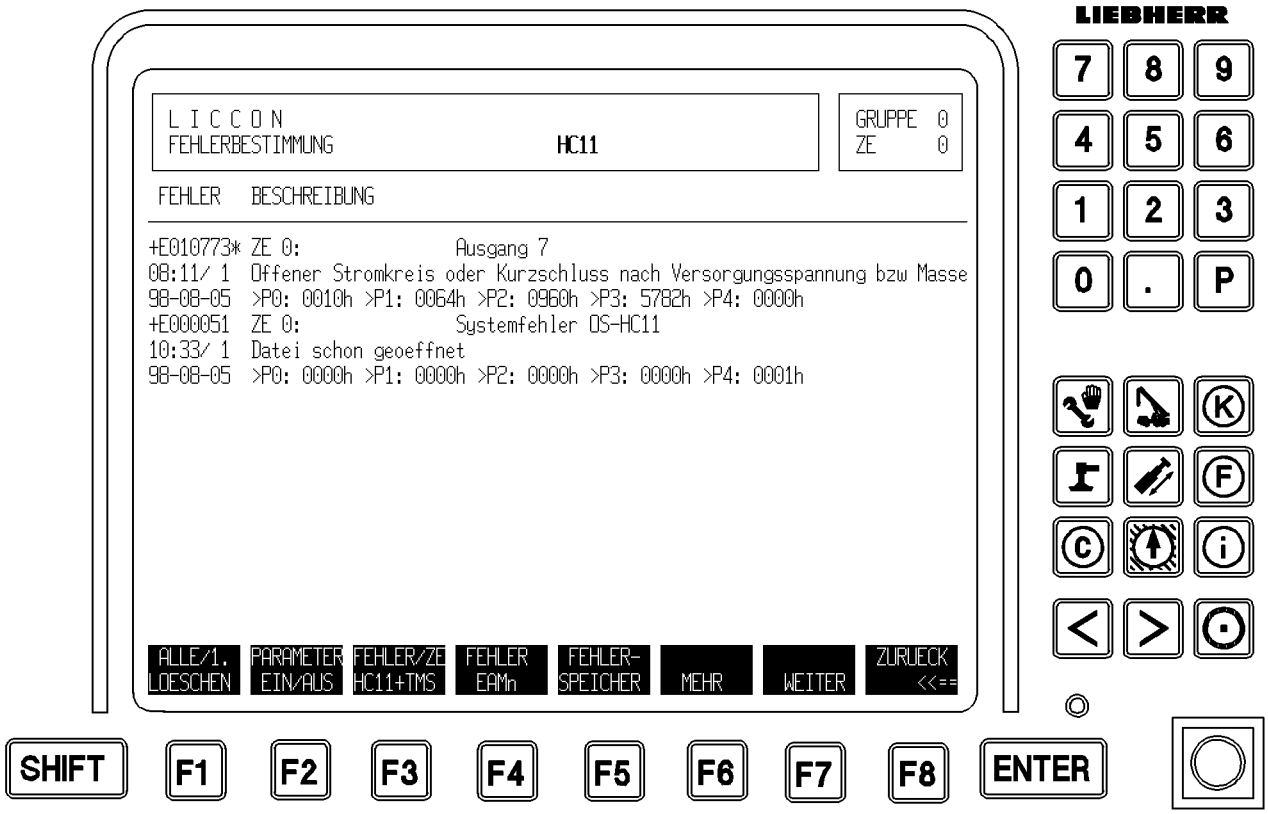
B194971

Error vault empty state

The empty state of the selected error vault is dependent on the sub-function “PARAMETER ON” or “PARAMETER OFF”:

– **Sub-function PARAMETER OFF**:
  If there is no active error and no operating error, the information “- no current ERROR entry ! ! -” will be displayed on the monitor.
  There may, however, still be inactive errors present in the error vault. In order to display these, call up sub-function PARAMETER ON using function key **F2**.
– **Sub-function PARAMETER ON**:
  If the error vault is completely empty, meaning that there are no old or inactive errors stored still, the information “- ERROR deleted ! ! -” will be displayed on the monitor.

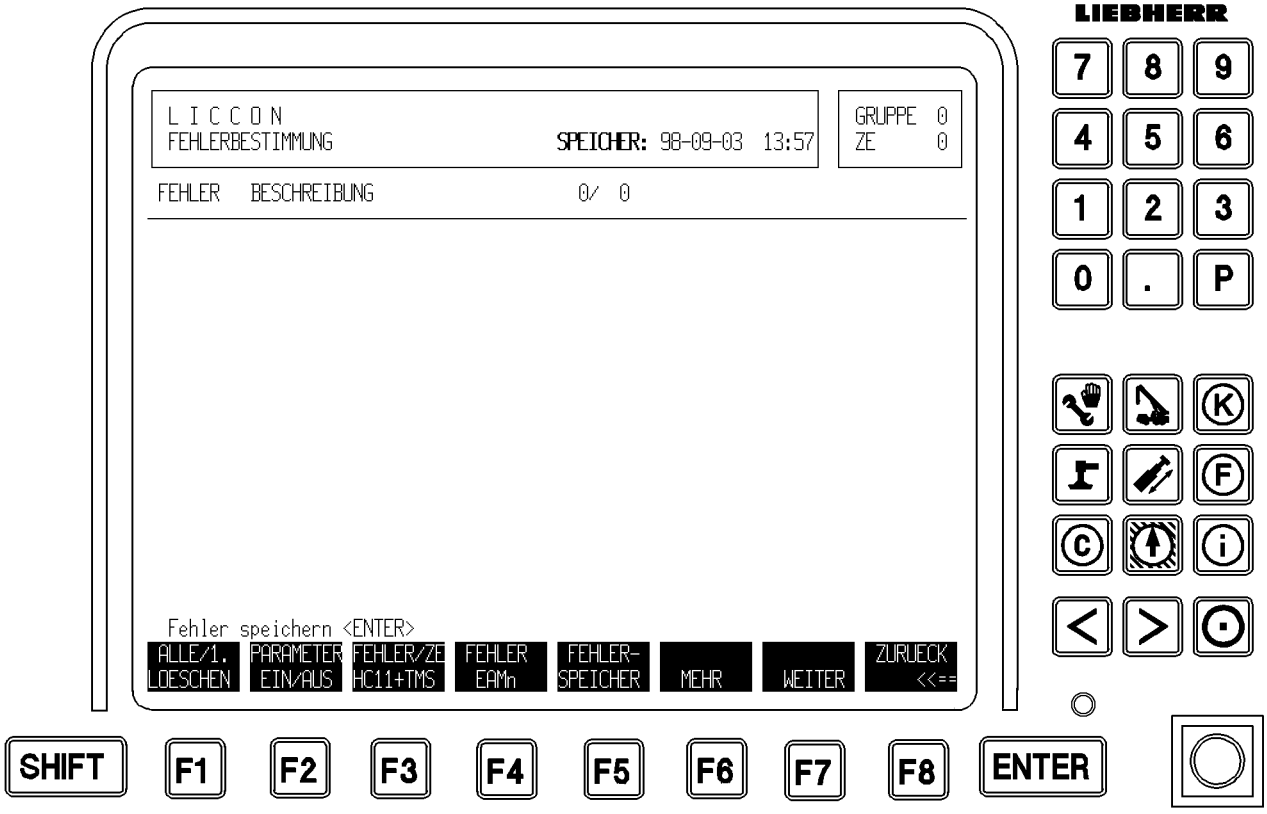

LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
HC11
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG
+E010773* ZE 0: Ausgang 7
08:11/ 1 Offener Stromkreis oder Kurzschluss nach Versorgungsspannung bzw Masse
+E000051 ZE 0: Systemfehler OS-HC11
10:33/ 1 Datei schon geoeffnet
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER-SPEICHER
MEHR
WEITER
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

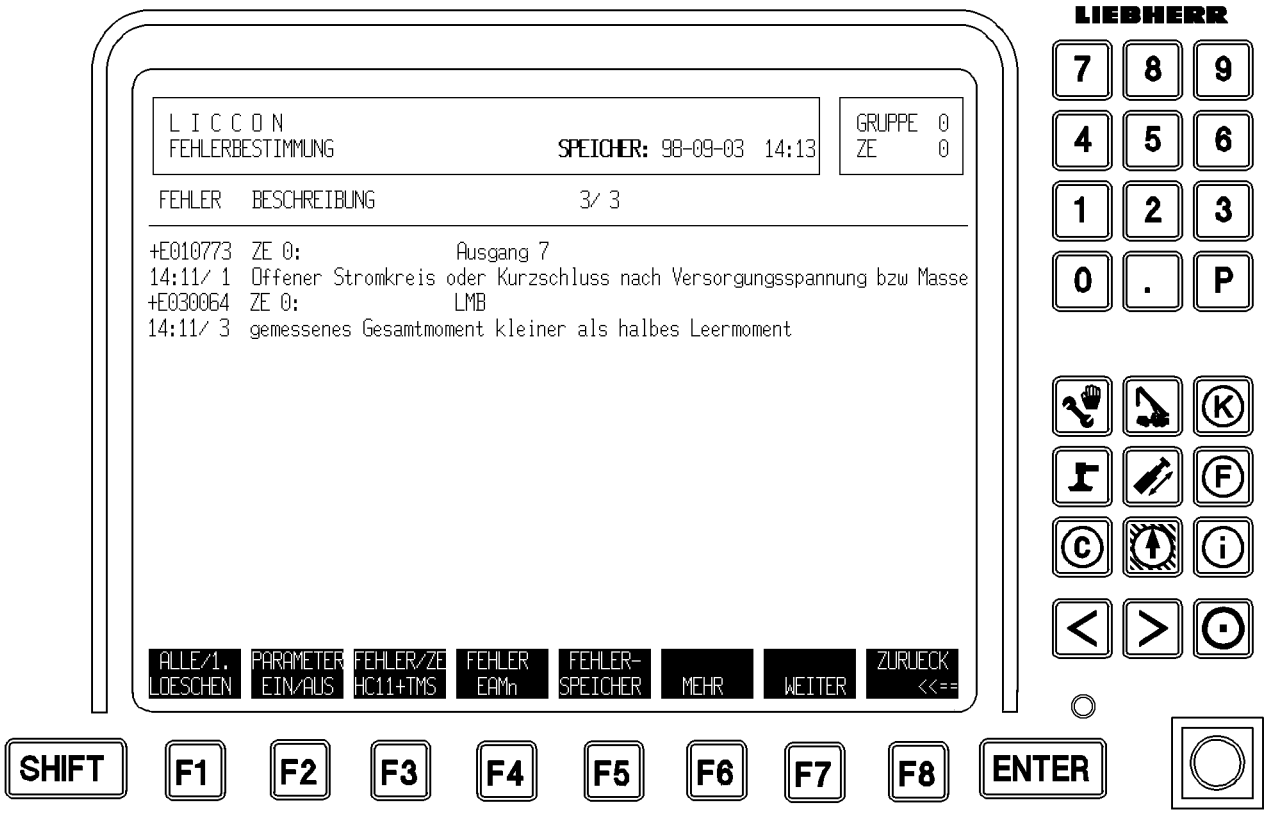

LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
HC11
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG
+E010773* ZE 0: Ausgang 7
08:11/ 1 Offener Stromkreis oder Kurzschluss nach Versorgungsspannung bzw Masse
98-08-05 >P0: 0010h >P1: 0064h >P2: 0960h >P3: 5782h >P4: 0000h
+E000051 ZE 0: Systemfehler OS-HC11
10:33/ 1 Datei schon geoeffnet
98-08-05 >P0: 0000h >P1: 0000h >P2: 0000h >P3: 0000h >P4: 0001h
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER-SPEICHER
MEHR
WEITER
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
SHIFT
F1
F2
F3
F4
F5
F6
F7
F8
ENTER

B194970

Function key line

F1 ALL/1ST DELETE	• Delete all errors Active errors will once again be displayed together with current date. • Use **SHIFT** + **F1** to delete the 1st error (*) on page 1 of the error vault.
F2 PARAMETER ON / OFF	• Detailed representation of the error vault • Active and inactive errors, as well as operating errors are on a third line together with the additional info. date and the parameters P0...P2 (P4). • In PARAMETER REPRESENTATION ON a maximum of 5 error entries per page can be seen.
F3 ERROR/CPU HC11 + TMS	• Call up HC11 or TMS error vault
F4 ERROR IOMn	• Call up of error vault from I/O module 1 • Press function key **F7** again: Error vaults of all I/O modules will be called up. • Use **SHIFT** + **ERROR IOMn** to reopen the first error page of the selected I/O module.
F5 ERROR MEMORY	• Call up the stored error state • Use **Shift** + **F5** to store all currently existing errors in non-volatile error memories of the power unit.
F6 MORE	• Call up more error pages (if present)
F7 FURTHER	• Press again: All error vaults will be called up one after the other.
F8 BACK	• Back towards “Main menu”


LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
SPEICHER: 98-09-03 13:57
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG 0/ 0
Fehler speichern <ENTER>
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER-SPEICHER
MEHR
WEITER
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER


LIEBHERR
L I C C O N
FEHLERBESTIMMUNG
SPEICHER: 98-09-03 14:13
GRUPPE 0
ZE 0
FEHLER BESCHREIBUNG 3/ 3
+E010773 ZE 0: Ausgang 7
14:11/ 1 Offener Stromkreis oder Kurzschluss nach Versorgungsspannung bzw Masse
+E030064 ZE 0: LMB
14:11/ 3 gemessenes Gesamtmoment kleiner als halbes Leermoment
ALLE/1. LOESCHEN
PARAMETER EIN/AUS
FEHLER/ZE HC11+TMS
FEHLER EAMn
FEHLER-SPEICHER
MEHR
WEITER
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

B194972

1.7.2 Error memories

A distinction is made between two possibilities:

1.) Driving mode
2.) Crane operation

With **Driving mode**, the following two possibilities exist:

– Crane types with one engine (superstructure) or with two engines (superstructure + chassis) **and** Change over from superstructure operation to chassis operation
  Here, momentarily or persistently occurring errors cannot be stored in the error memory of the power unit. When the ignition in the chassis is switched off, all errors in the error memory are automatically cleared.
  Since you have to switch off the ignition in the chassis in order to start the LICCON computer system in the superstructure, you should note down any errors before switching off the ignition.
– Driving mode in the case of crane types with two engines (superstructure + chassis) **without** Change over from superstructure operation to chassis operation
  Momentarily or persistently occurring errors (maximum of 160) can be stored in a non-volatile error memory (RAM) of the power unit. Since you can start the LICCON computer system in the superstructure independently of the chassis it is possible to store the errors in the error vault.

With **Crane operation**, momentarily or persistently occurring errors (maximum of 160) can be stored via the LICCON monitor in a non-volatile error memory (RAM) of the power unit independently of the number of engines on the crane.

Storing errors

- Press the key combination **SHIFT** + **F5**.
- Confirm storage using the key **ENTER**.

Result: All current errors are stored.

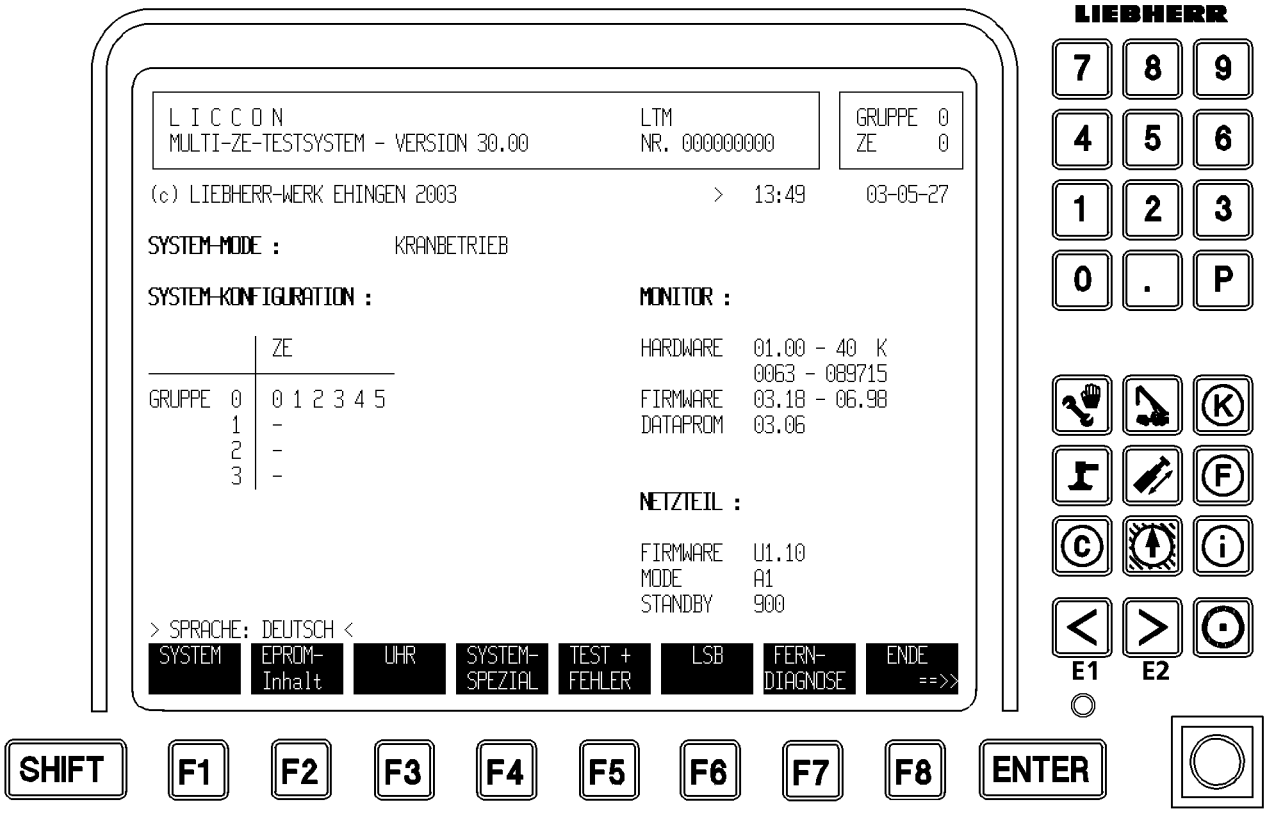
Calling up stored errors in the error determination screen

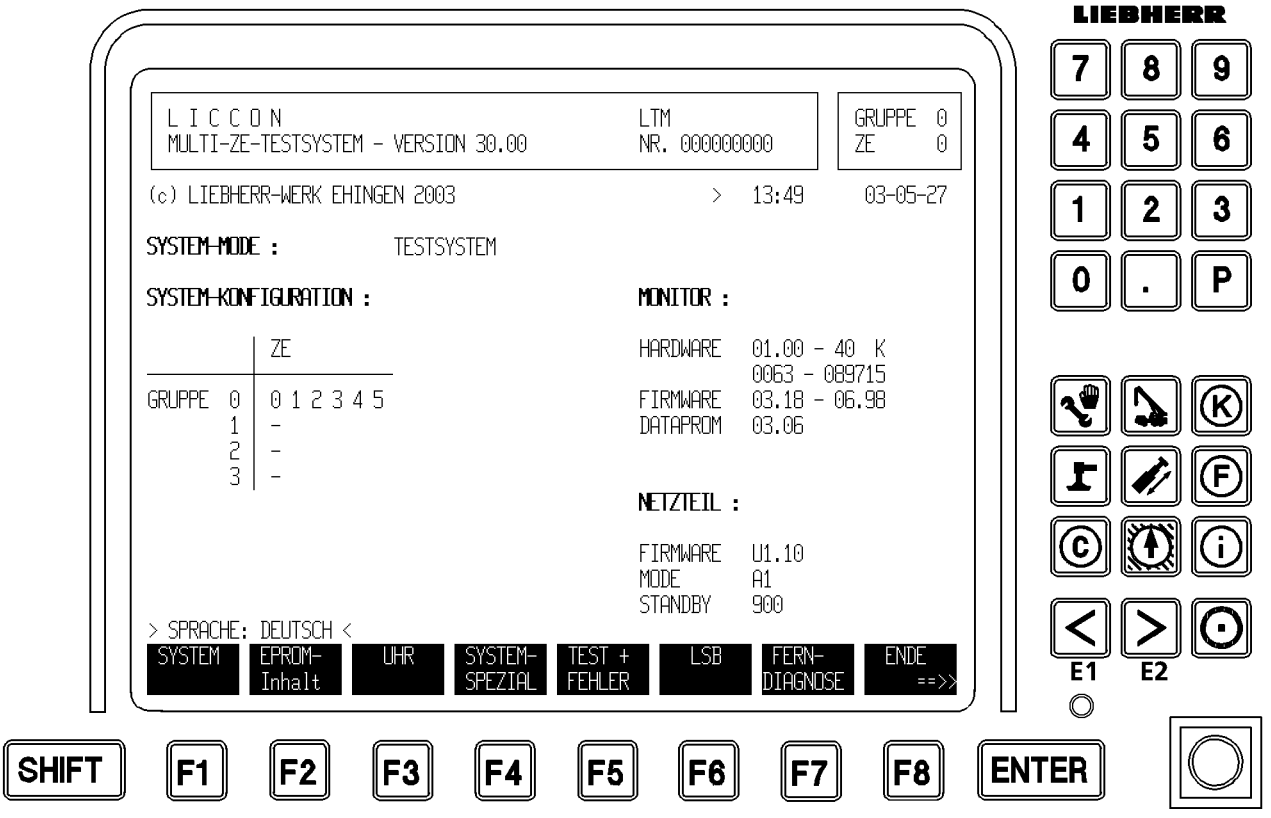
- Press function key **F5**.

Result: The date and time of storage appears in the header: **MEMORY:** 98-09-03 14:13

Function key line

see “Error memories” in section “LICCON error determination”


LIEBHERR
L I C C O N
MULTI-ZE-TESTSYSTEM - VERSION 30.00
LTM
NR. 000000000
GRUPPE 0
ZE 0
(c) LIEBHERR-WERK EHINGEN 2003
> 13:49 03-05-27
SYSTEM-MODE : KRANBETRIEB
SYSTEM-KONFIGURATION :
ZE
GRUPPE 0 0 1 2 3 4 5
1 -
2 -
3 -
MONITOR :
HARDWARE 01.00 - 40 K
0063 - 089715
FIRMWARE 03.18 - 06.98
DATAPROM 03.06
NETZTEIL :
FIRMWARE U1.10
MODE A1
STANDBY 900
> SPRACHE: DEUTSCH <
SYSTEM
EPROM-Inhalt
UHR
SYSTEM-SPEZIAL
TEST + FEHLER
LSB
FERN-DIAGNOSE
ENDE ==>>
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER


LIEBHERR
L I C C O N
MULTI-ZE-TESTSYSTEM - VERSION 30.00
LTM
NR. 000000000
GRUPPE 0
ZE 0
(c) LIEBHERR-WERK EHINGEN 2003
> 13:49 03-05-27
SYSTEM-MODE : TESTSYSTEM
SYSTEM-KONFIGURATION :
ZE
GRUPPE 0 0 1 2 3 4 5
1 -
2 -
3 -
MONITOR :
HARDWARE 01.00 - 40 K
0063 - 089715
FIRMWARE 03.18 - 06.98
DATAPROM 03.06
NETZTEIL :
FIRMWARE U1.10
MODE A1
STANDBY 900
> SPRACHE: DEUTSCH <
SYSTEM
EPROM-Inhalt
UHR
SYSTEM-SPEZIAL
TEST + FEHLER
LSB
FERN-DIAGNOSE
ENDE ==>>
7 8 9
4 5 6
1 2 3
0 . P
K
F
C
i
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

B194936

1.8 Procedure for LSB sensor programming

LSB sensor programming does not require use-authorization via a code.

For reasons of safety, LSB sensor programming can **only** be activated in the system mode “TEST SYSTEM”.

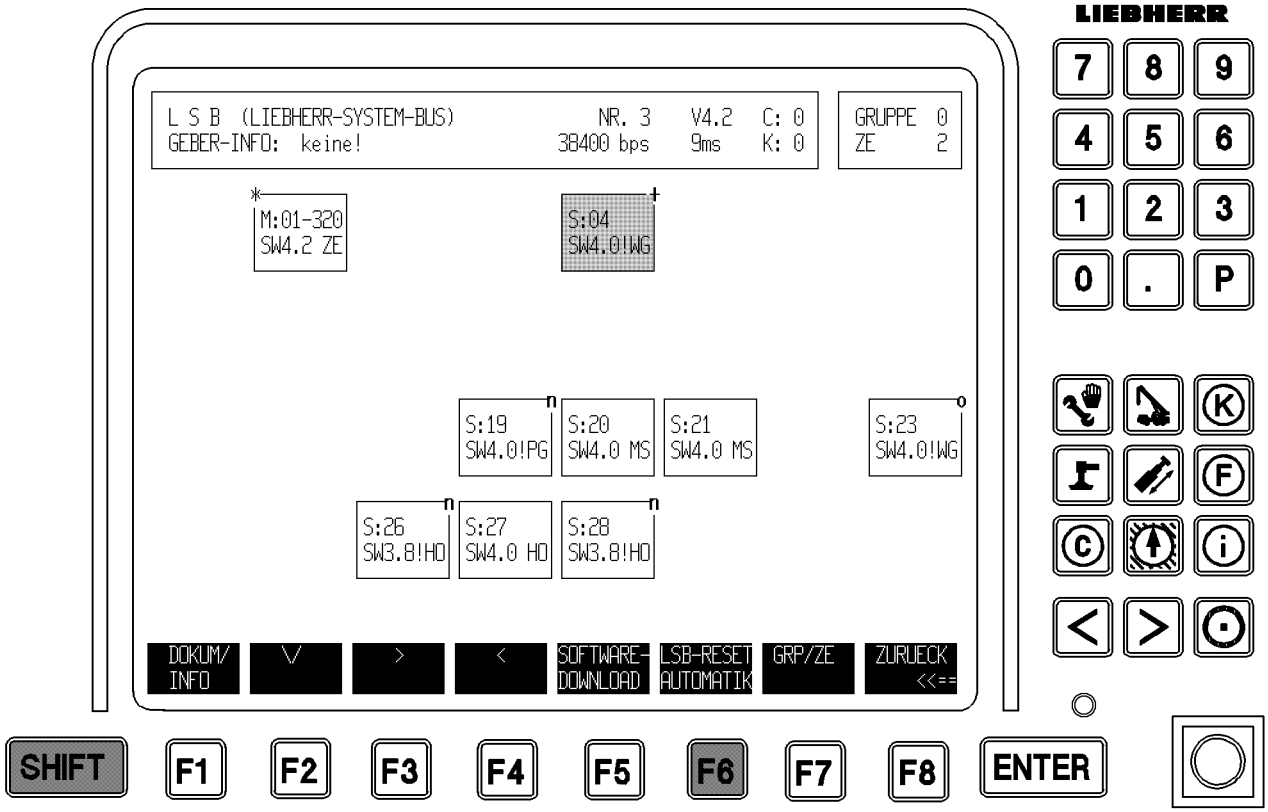
A uniquely identifiable sensor possesses the following characteristics:

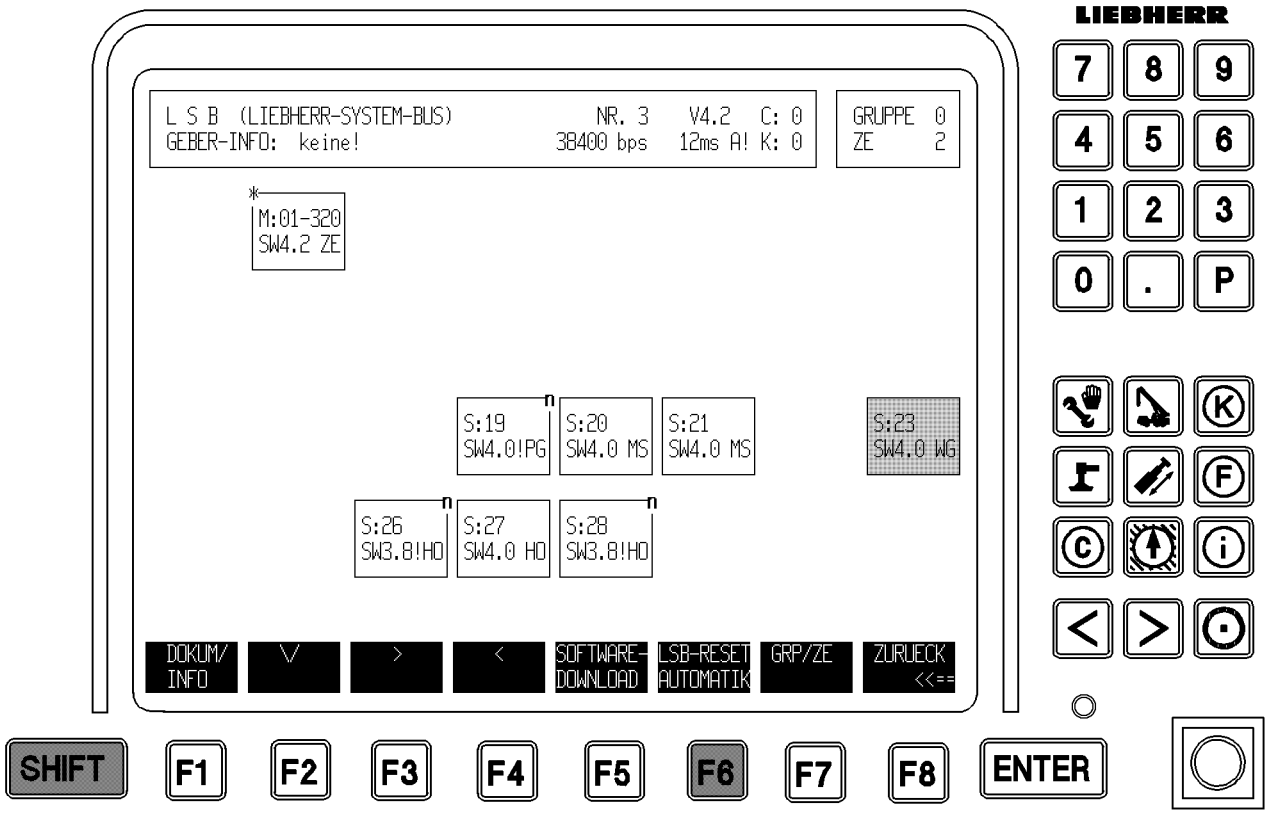
– the address of the sensor on the relevant LIEBHERR system bus is not yet available
– the sensor possesses a unique type identifier

Two procedures are possible:

1.) Automatically assigning a uniquely identifiable sensor
2.) Assigning **not** uniquely identifiable sensors semi-automatically

Ensure that the LICCON computer system is started in system mode “TEST SYSTEM” (see section “Starting the Multi-CPU test system”, “System mode TEST SYSTEM”).


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 3 V4.2 C: 0
GEBER-INFO: keine! 38400 bps 9ms K: 0
GRUPPE 0
ZE 2
M:01-320 SW4.2 ZE
S:04 SW4.0!WG
S:19 SW4.0!PG
S:20 SW4.0 MS
S:21 SW4.0 MS
S:23 SW4.0!WG
S:26 SW3.8!HO
S:27 SW4.0 HO
S:28 SW3.8!HO
DOKUM/ INFO
SOFTWARE- DOWNLOAD
LSB-RESET AUTOMATIK
GRP/ZE
ZURUECK
7 8 9
4 5 6
1 2 3
0 . P
SHIFT
F1 F2 F3 F4 F5 F6 F7 F8
ENTER


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 3 V4.2 C: 0
GEBER-INFO: keine! 38400 bps 12ms A! K: 0
GRUPPE 0
ZE 2
M:01-320 SW4.2 ZE
S:19 SW4.0!PG
S:20 SW4.0 MS
S:21 SW4.0 MS
S:23 SW4.0 WG
S:26 SW3.8!HO
S:27 SW4.0 HO
S:28 SW3.8!HO
DOKUM/ INFO
SOFTWARE- DOWNLOAD
LSB-RESET AUTOMATIK
GRP/ZE
ZURUECK
7 8 9
4 5 6
1 2 3
0 . P
SHIFT
F1 F2 F3 F4 F5 F6 F7 F8
ENTER

B194973

1.8.1 Automatically assigning a uniquely identifiable sensor

Example: Angle sensor with incorrect, but not allocated address

☞ **Notice!**
Install the sensor!
! Only install and subsequently assign one sensor on the LSB bus.
! Note possible bus conflicts.

- Install the sensor.
- Press function key **F6**.

Result: “LSB overview screen” appears.
Sensor appears with the mark “+”.

- Press keys **SHIFT** + **F6** (AUTOMATIC).

Result: Automatic assignment is started and will be displayed by “A!” in the header of the LSB overview screen.
The assignment is only related to this LIEBHERR system bus.
All sensors which are already in their predefined places will be tested. If necessary, they will be assigned default values (predefined values).
All sensors which can uniquely be assigned to a bus phase will be programmed at their predefined address. They will automatically be assigned default values. Assignment occurs by means of the type identifier which each sensor possesses.
The automatic system can only identify a sensor by means of the type identifier. It is therefore possible that two identical sensor types are interchanged in terms of their function (for example a length sensor with an angle sensor).
There are 2 possibilities for interchanging two sensors:

1.) Conventional procedure: Isolate programming functions via LICCON-Error-Code and manual address allocation with automatic system switched off
2.) Connect sensor via automatic system to a different LSB at address 0

The master switch (MS) and pedal sensor (PS) are exceptions. By means of external circuit elements in the connection plug, these sensor types provide additional information which is used during identification and automatic allocation to the correct address. If the coding in the plug is different on all master switches and pedal sensors, these sensors can be uniquely assigned, even if several identical sensor types exist on one LIEBHERR system bus.

- Press keys **SHIFT** + **F6** (AUTOMATIC).

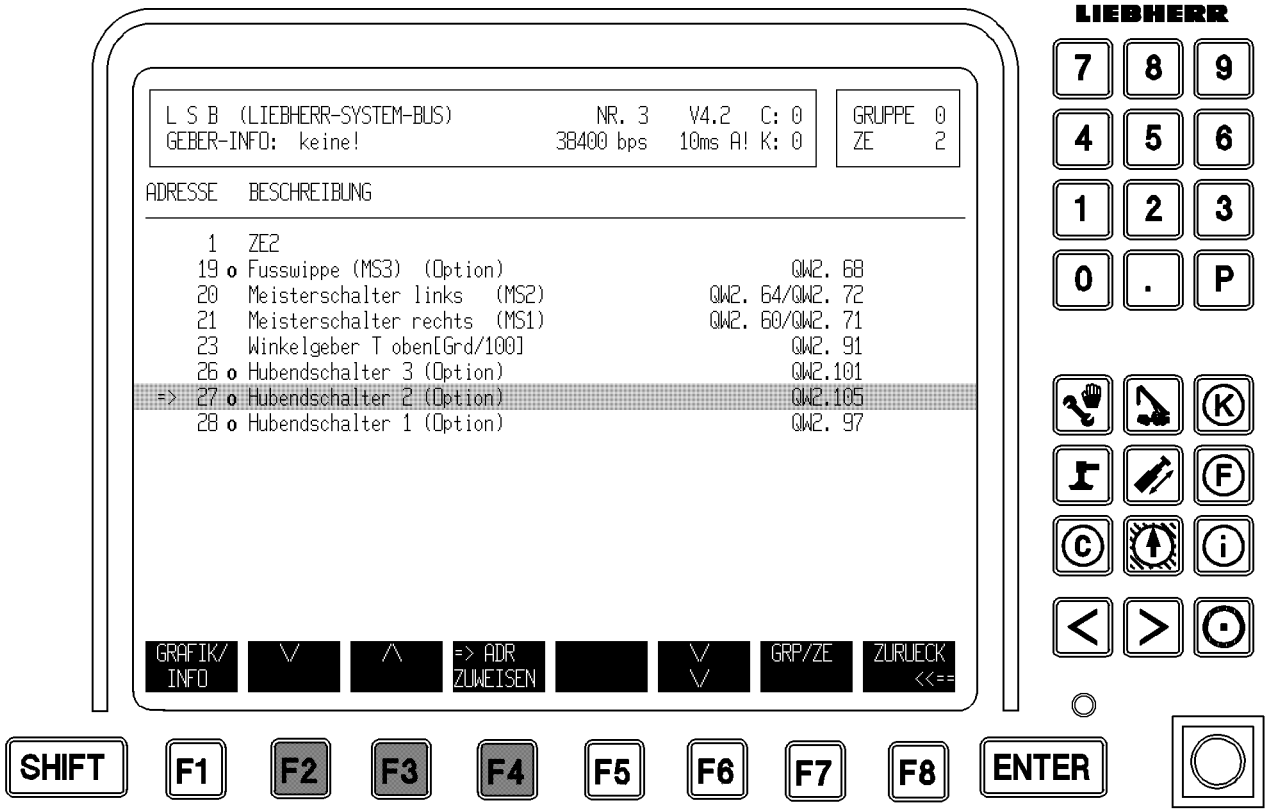
Result: Automatic assignment is completed.

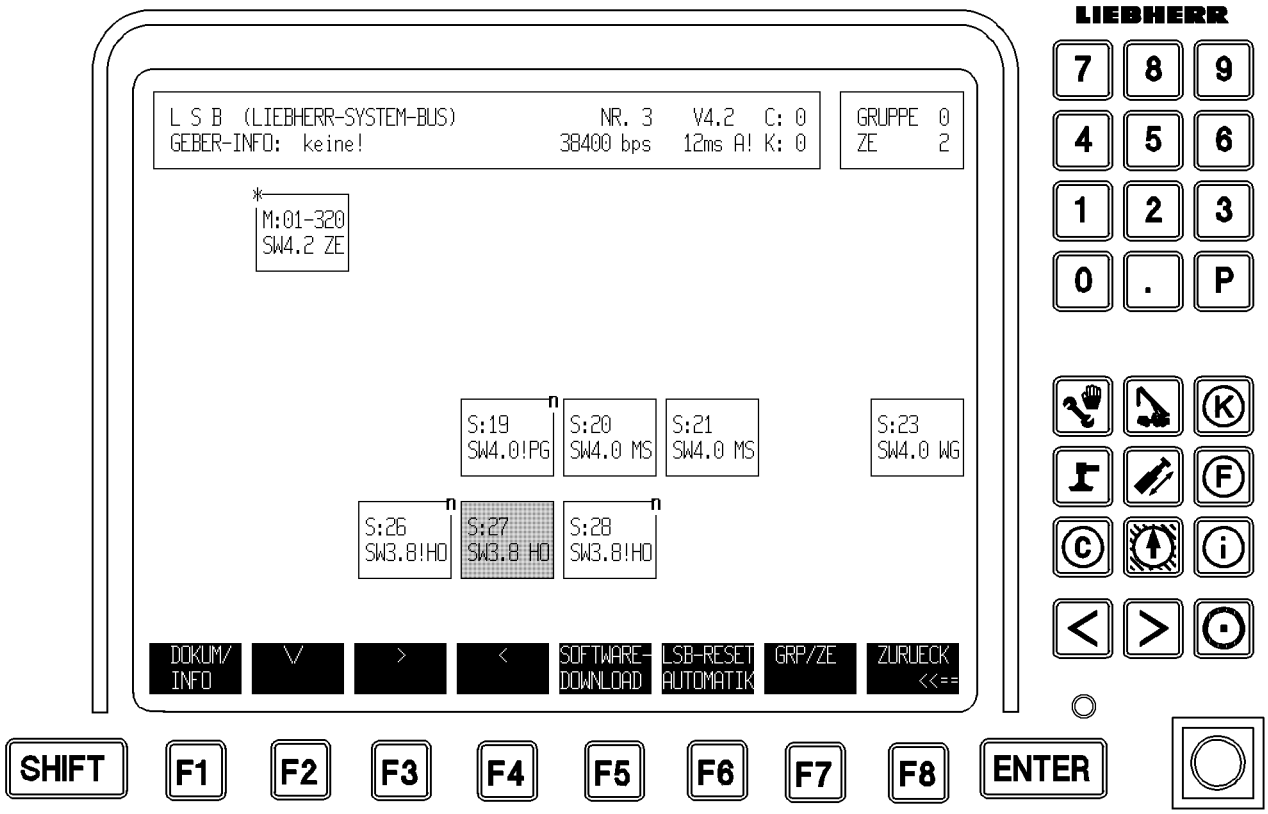
☞ **Notice!**
Switching over from system mode “TEST SYSTEM” to system mode “CRANE OPERATION”.
For safety reasons, switching over is **not** possible.
! Stop and restart the LICCON computer system (see section “Starting the Multi-CPU test system”, “System mode Crane operation”).

- Restart the LICCON computer system in system mode “CRANE OPERATION”.

Troubleshooting
Sensor cannot be assigned using automatic assignment and is allocated address 0?
Example: Hoist limit switch with incorrect, but not allocated address. Sensors which cannot be assigned uniquely are assigned the address 0. If address 0 has already been filled by another sensor the next free (not configured) position will be selected. As soon as address 0 is free, the automatic system ensures that the next sensor which cannot be assigned is allocated address 0.

- To assign sensors from address 0 using semi-automatic assignment, see the section “Assigning not uniquely identifiable sensors semi-automatically”.


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 3 V4.2 C: 0
GEBER-INFO: keine! 38400 bps 10ms A! K: 0
GRUPPE 0
ZE 2
ADRESSE BESCHREIBUNG
1 ZE2
19 o Fusswippe (MS3) (Option) QW2. 68
20 Meisterschalter links (MS2) QW2. 64/QW2. 72
21 Meisterschalter rechts (MS1) QW2. 60/QW2. 71
23 Winkelgeber T oben[Grd/100] QW2. 91
26 o Hubendschalter 3 (Option) QW2.101
=> 27 o Hubendschalter 2 (Option) QW2.105
28 o Hubendschalter 1 (Option) QW2. 97
GRAFIK/ INFO
=> ADR ZUWEISEN
GRP/ZE
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER


LIEBHERR
L S B (LIEBHERR-SYSTEM-BUS) NR. 3 V4.2 C: 0
GEBER-INFO: keine! 38400 bps 12ms A! K: 0
GRUPPE 0
ZE 2
M:01-320
SW4.2 ZE
S:19 SW4.0!PG
S:20 SW4.0 MS
S:21 SW4.0 MS
S:23 SW4.0 WG
S:26 SW3.8!HD
S:27 SW3.8 HD
S:28 SW3.8!HD
DOKUM/ INFO
SOFTWARE- DOWNLOAD
LSB-RESET AUTOMATIK
GRP/ZE
ZURUECK <<==
7 8 9
4 5 6
1 2 3
0 . P
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

B194975

1.8.2 Assigning not uniquely identifiable sensors semi-automatically

Example: Hoist limit switch

– Automatic assignment is started as previously described and will be displayed by “A!” in header of the LSB overview screen.
– Sensor cannot be assigned using automatic assignment and appears at address 0 in the LSB overview screen.

- Press function key **F6**.

Result: “LSB overview screen” appears.

- Press function key **F1**.

Result: View changes to documentation representation of the LSB overview.

- Press function key **F2** or function key **F3**.

Result: Place selection pointer on the target station. The possible free target stations are marked with an “**o** ”.

- Press function key **F4**.

Result: Sensor will be assigned to the target location from address 0 and address 0 will be free again. Automatic assignment continues as described previously. The newly assigned station will be tested automatically and given default values. The next sensor that cannot be assigned will be assigned to address 0 by the automatic system and can therefore be assigned semi-automatically.

Troubleshooting

“**A!** ” does not appear in the header of the LSB overview and automatic assignment is therefore not active?

It is possible that the automatic system is not active during semi-automatic assignment.

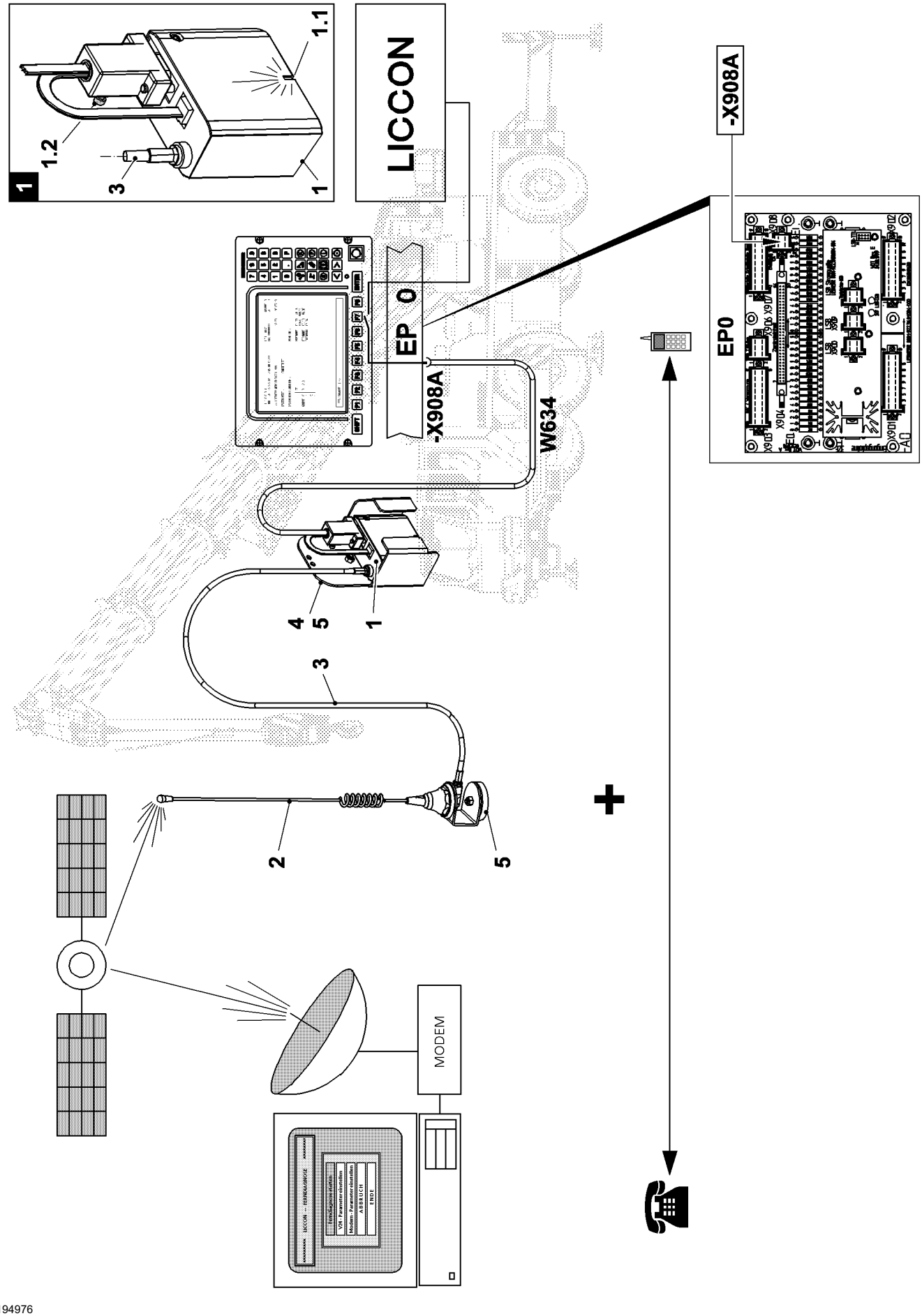
- Assign default values manually in this case. (see section “LSB detail display slave”, “Hoist limit switch with wind sensor”, “Function key line”)

- If all sensors are assigned (automatically and semi-automatically):
  Press keys **SHIFT** + **F6** (AUTOMATIC).

Result: Automatic assignment is completed.

☞ **Notice!**
Switching over from system mode “TEST SYSTEM” to system mode “CRANE OPERATION”.
For safety reasons, switching over is **not** possible.
! Stop and restart the LICCON computer system (see section “Starting the Multi-CPU test system”, “System mode Crane operation”).

- Restart the LICCON computer system in system mode “CRANE OPERATION”.



B194976

1 Remote diagnostics*

LWE remote diagnostics allows LIEBHERR cranes to be serviced remotely in the event of an error.
The remote diagnostics module must be linked to the LICCON computer system of the crane.
From here, data can be read off the LICCON computer system via the Multi-CPU test system and transferred to the LIEBHERR customer service computer or to a LIEBHERR service point.
A connection must also be made with LIEBHERR customer service or a LIEBHERR service point by mobile telephone.
Always ensure that the instructions given by the LIEBHERR customer service or LIEBHERR service point are followed precisely.

1.0.1 LWE remote diagnostics module

1 GSM module
1.1 Status LED
1.2 “Reset” key
2 Radio antenna
3 Antenna cable
4 Holder
5 Permanent magnet

- The SIM-card is **not** provided together with the remote diagnostics module.

1.1 Activating the remote diagnostics module or remote diagnostics device

Before the remote diagnostics can be carried out, certain preconditions have to be fulfilled to ensure trouble-free execution of the remote diagnostics / connection to the GSM module.
Activation of the remote diagnostics device is first carried out by LIEBHERR customer service.
Ensure that

– the crane operator has a valid SIM-card[1] (telephone card for mobile telephones) from a current mobile network operator
– the telephone number of the data service is known
– the PIN code request of the SIM-card[1] is deactivated
– the SIM-card[1] is built into the GSM module

The SIM-card[1] offers three different telephone services, each of which has its own telephone number:

– Language
– Fax
– **Data**

☞ **Notice!**
Deactivate SIM-card[1]!
To deactivate the SIM-card[1], a standard mobile telephone is required.
! Insert the SIM-card[1] into this mobile telephone and switch off or deactivate the PIN code request.

[1] The SIM-card is not provided together with the remote diagnostics module.

- Insert the 4-pin cable connector **-X908** of the connection cable **W634** from the LWE remote diagnostics module into the interface on the input PCB 0 **EP0**.

Result: The GSM module is now linked via this interface on the IPCB0 with the LICCON.

Have the following control parameters entered on the LICCON **only by LIEBHERR customer service**!

- One-time entry of control parameters “CW.6.115=-1” and “CW.6.116=-1” by LIEBHERR customer service.

Once the entry of the control parameters has been successfully carried out, the following steps must be taken to make the connection.

Telephone number data service of the crane operator:	_____ (please enter telephone number here)

- Call by mobile telephone to the appropriate LIEBHERR customer service point (CS-point) and give the telephone number of the data service to the customer service employee.

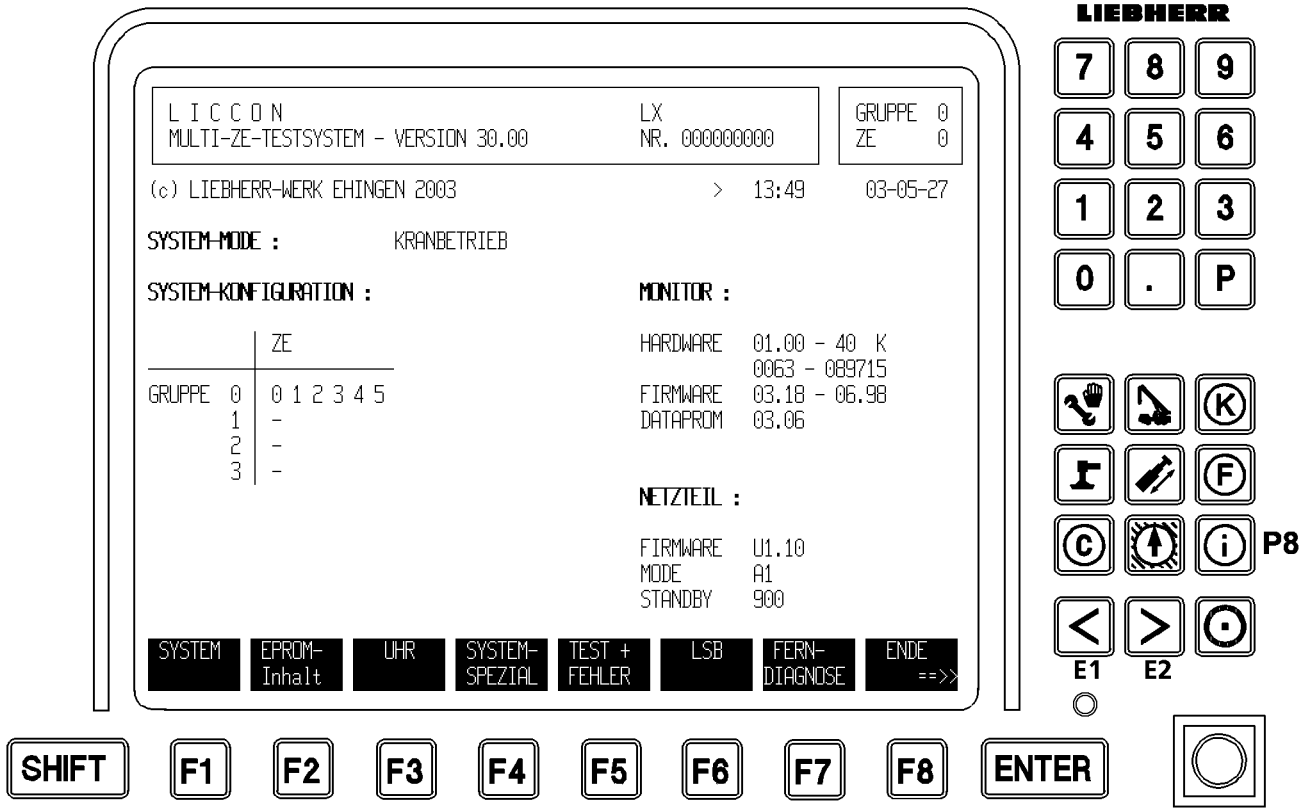
☞ **Notice!**
Transferral of information
! Only text functions, i.e. only information from the system mode “TEST SYSTEM” will be transferred by radio.

- Start the superstructure engine and press program key **P8** (“i” -key) to change to the program “Multi-CPU test system”.
- The CS point calls the “crane” using the telephone number of the data service. The connection is visible to the crane operator by the flickering of the status LED **1.1** on the GSM module **1**.
- If the LIEBHERR customer service employee asks over the phone for this to be done:
  Start remote diagnostics: Press function key **F7** on the LICCON monitor.

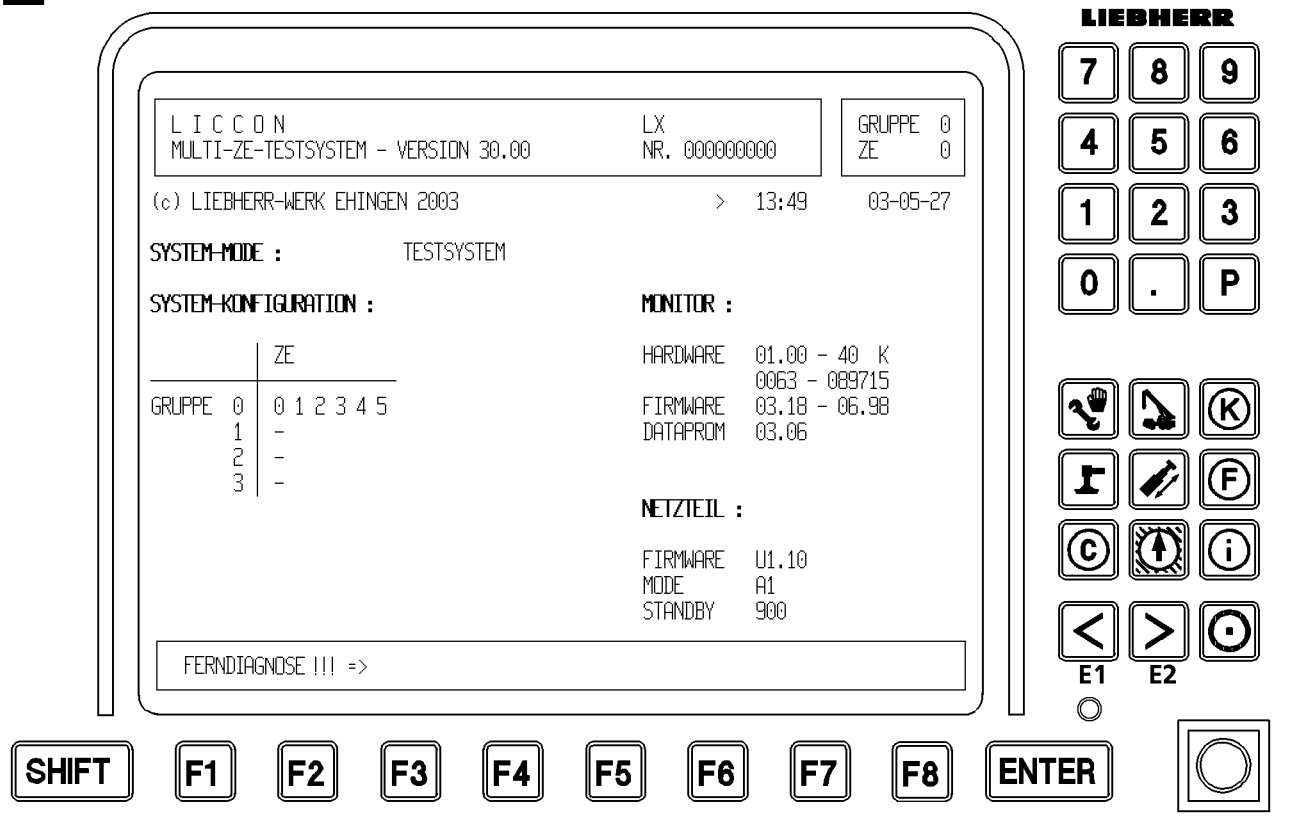
Result: The data from the CPU0 will be transferred via the console computer to the remote diagnostics module.

blank page!

2


LIEBHERR
L I C C O N
MULTI-ZE-TESTSYSTEM - VERSION 30.00
LX
NR. 000000000
GRUPPE 0
ZE 0
(c) LIEBHERR-WERK EHINGEN 2003
> 13:49 03-05-27
SYSTEM-MODE : KRANBETRIEB
SYSTEM-KONFIGURATION :
ZE
GRUPPE 0 0 1 2 3 4 5
1 -
2 -
3 -
MONITOR :
HARDWARE 01.00 - 40 K
0063 - 089715
FIRMWARE 03.18 - 06.98
DATAPROM 03.06
NETZTEIL :
FIRMWARE U1.10
MODE A1
STANDBY 900
SYSTEM
EPROM-Inhalt
UHR
SYSTEM-SPEZIAL
TEST + FEHLER
LSB
FERN-DIAGNOSE
ENDE ==>>
7 8 9
4 5 6
1 2 3
0 . P
K
F
P8
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

3


LIEBHERR
L I C C O N
MULTI-ZE-TESTSYSTEM - VERSION 30.00
LX
NR. 000000000
GRUPPE 0
ZE 0
(c) LIEBHERR-WERK EHINGEN 2003
> 13:49 03-05-27
SYSTEM-MODE : TESTSYSTEM
SYSTEM-KONFIGURATION :
ZE
GRUPPE 0 0 1 2 3 4 5
1 -
2 -
3 -
MONITOR :
HARDWARE 01.00 - 40 K
0063 - 089715
FIRMWARE 03.18 - 06.98
DATAPROM 03.06
NETZTEIL :
FIRMWARE U1.10
MODE A1
STANDBY 900
FERNDIAGNOSE !!! =>
7 8 9
4 5 6
1 2 3
0 . P
K
F
E1 E2
SHIFT F1 F2 F3 F4 F5 F6 F7 F8 ENTER

B194977

1.2 Carrying out a remote diagnostics

As soon as the remote diagnostics has been started by the crane driver, the initialization display of the Multi-CPU test system (see Illustration **3**) will be “frozen” on the crane's LICCON monitor.
The LIEBHERR customer service employee can now service the LICCON test system via the connection from his PC to the remote diagnostics module.

Danger!
Increased danger of accidents!
Despite the frozen screen, the crane driver is still able to drive all crane functions **without** the operating screen. Single exception: “Automatic telescoping mode”.

! Execute all crane movements with the utmost care, lowest possible acceleration and minimum speed.

! Ensure that the telephone contact with the LIEBHERR customer service employee is maintained continually.

! Follow all instructions given by the customer service employee.

1.2.1 Identifying errors

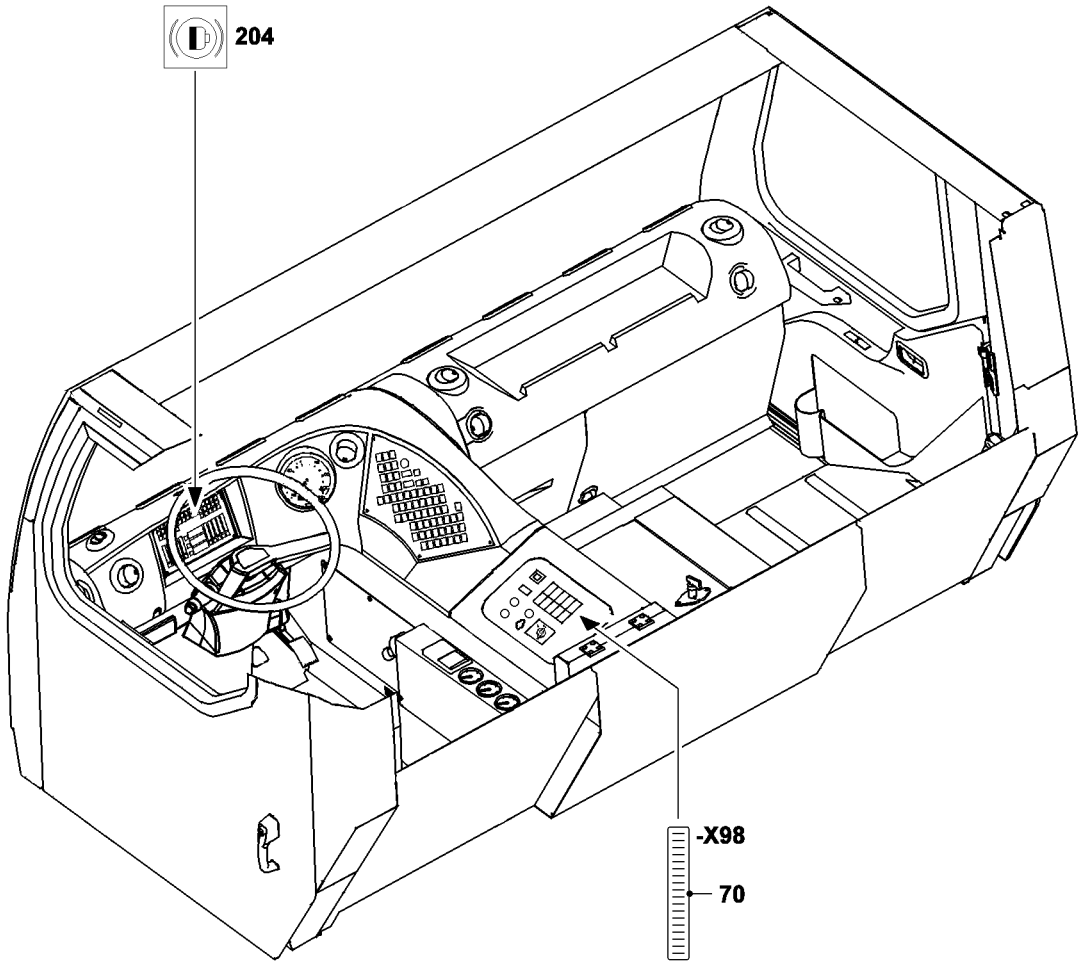
The remote diagnostics system can only identify static, electrical errors which are scanned in a time reference greater than 2 seconds.

- If an error only appears sporadically during work with the crane:
  Leave the crane switched on.

Result: LIEBHERR customer service can call the crane using the remote diagnostics system in order to locate the error.

Troubleshooting
No data connection to the crane can be made?
The data connection has failed. The GSM module will have to be reinitialized and the data connection reestablished for remote diagnostics.

- Only if advised specifically to do so by the LIEBHERR customer service employee: Press the key “Reset” **1.2** on the GSM module.



B197975

1 Diagnostics – disk brake pads*

If the warning light **204** on the display unit light up, it is a sign that at least one brake pad on the crane is worn and has reached the wear limit.

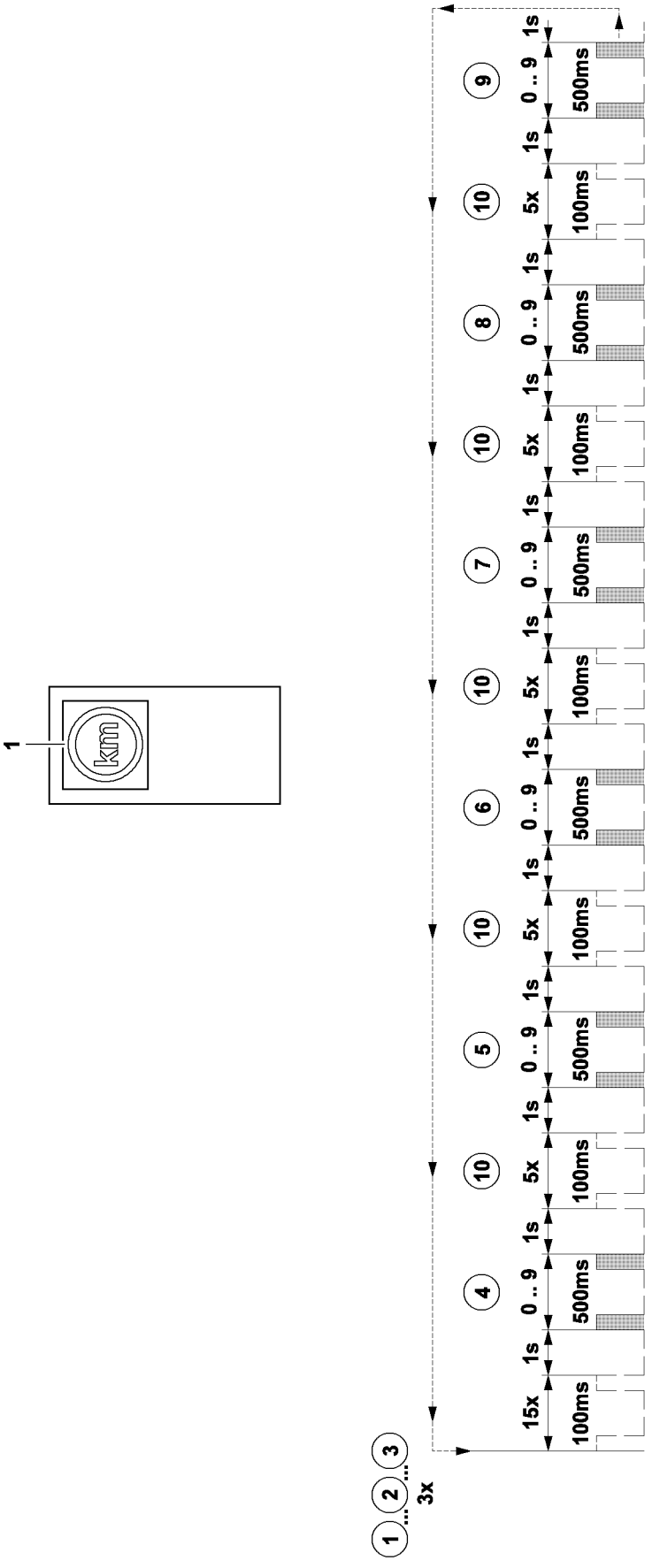
1.1 Finding the worn disk brake pad

You can find the worn brake pad via the diagnostics plug -X98 **70** – which is in the center console. Make sure that the cover of the center console is open:

– Make sure that the diagnostics plug -X98 **70** is easily accessible
– Prepare the multimeter for diagnostics

☞ **Notice!**
Note
! Carry out the diagnostics for each brake pad individually.
! Connect the multimeter for the diagnostics according to the wiring diagram.
! The current determined with the multimeter provides information if the inspected brake pad is OK or if the brake pad is worn, or an electrical problem is present in the diagnostics circuit.
! During the diagnostics of the disk brake pads, always check all brake pads.

Diagnostics – disk brake pads	
Signal	**Description**
24 V	Brake pad OK.
0 V	Brake pad worn and / or electrical problem in diagnostics circuit



B197948

1 Trailing axle diagnostics*

Danger!
Danger of accident!
! If an error occurs on the trailing axle during the driving mode - recognizable by the blinking control light **1** in the center console - then - for safety reasons - travel must be stopped immediately, see chapter 6.09 **Section** “Driving the crane”.

In case of an error on the trailing axle, after turning on the ignition, a blinker code is issued on the control light **1** and at the same time, the buzzer sounds **three times** (3x) .

Notice!
Note
! The blinker code is evaluated according to the illustration on the opposite page.
! If several errors are present at the same time, then they are shown by a blinker code, one after the other, via the control light **1**.
! All issued errors are repeated until the ignition is turned off and the error (s) is / are remedied.
! As a matter of principle, all errors, which are issued on the control light **1**, must be evaluated.

Danger!
Danger of accident!
! Any errors which occur on the trailing axle must be remedied before starting to drive.
! Driving the crane with active errors on the trailing axle is **explicitly prohibited**!

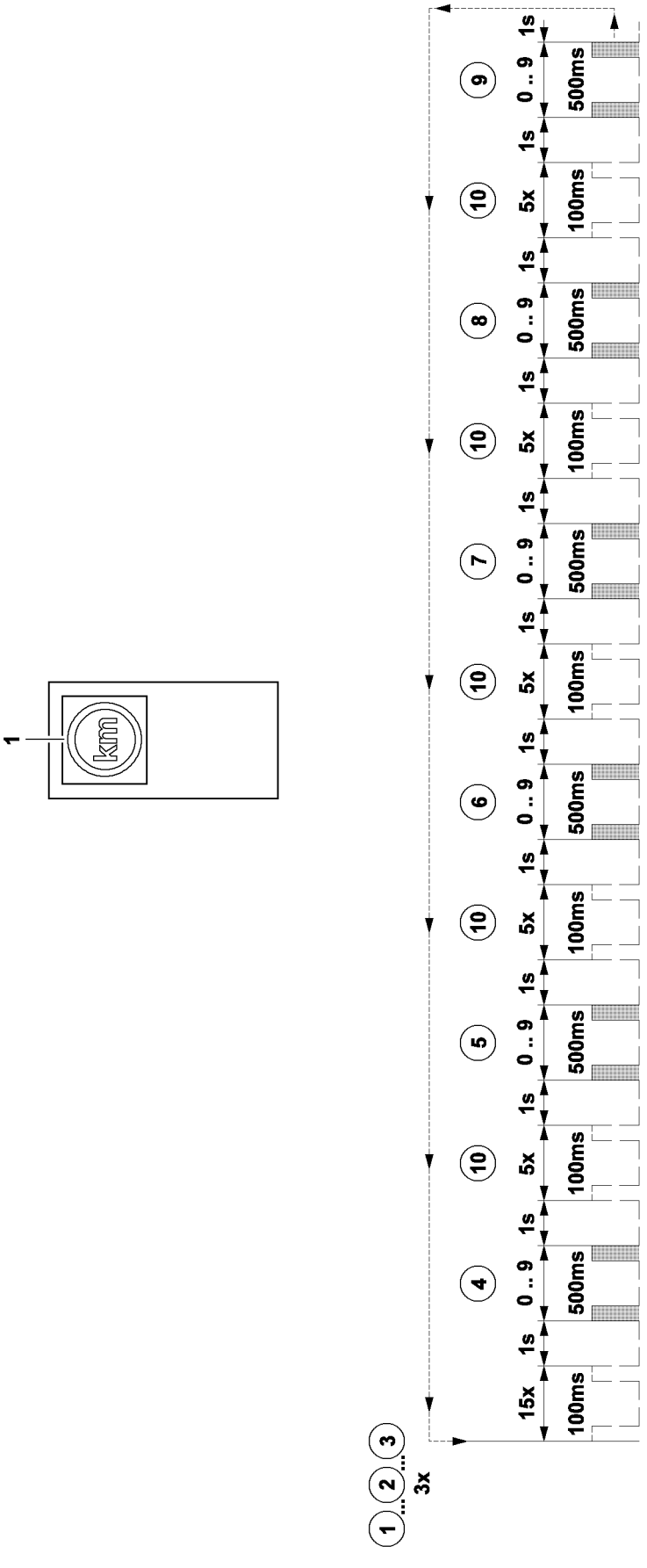
The evaluated blinker code corresponds to the LICCON Error Code (LEC), see chapter 20.05.

1.1 Configuration of the blinker code /LICCON Error Codes

Notice!
Note
! The LICCON Error Code (LEC) issued via the control light **1** is a straight number code and is equated to the error classification **“System error”** .

The LICCON Error Code (LEC) is combined of device (**1st and 2nd number** of the LEC), error path (**3rd and 4th number** of the LEC) and type of error (**5th and 6th number** of the LEC), see chapter 20.05.

LICCON Error Code (example): 3 9 4 2 1 5						
Description	**Device**		**Error**			
			path		**type**	
	10	1	10	1	10	1
	3	**9**	**4**	**2**	**1**	**5**
LEC	**39**		**42**		**15**	


1
km
1 2 3 ... 3x
15x 100ms 1s 0 .. 9 500ms 1s 4
10 5x 100ms 1s 0 .. 9 500ms 1s 5
10 5x 100ms 1s 0 .. 9 500ms 1s 6
10 5x 100ms 1s 0 .. 9 500ms 1s 7
10 5x 100ms 1s 0 .. 9 500ms 1s 8
10 5x 100ms 1s 0 .. 9 500ms 1s 9
10 5x 100ms 1s 0 .. 9 500ms 1s

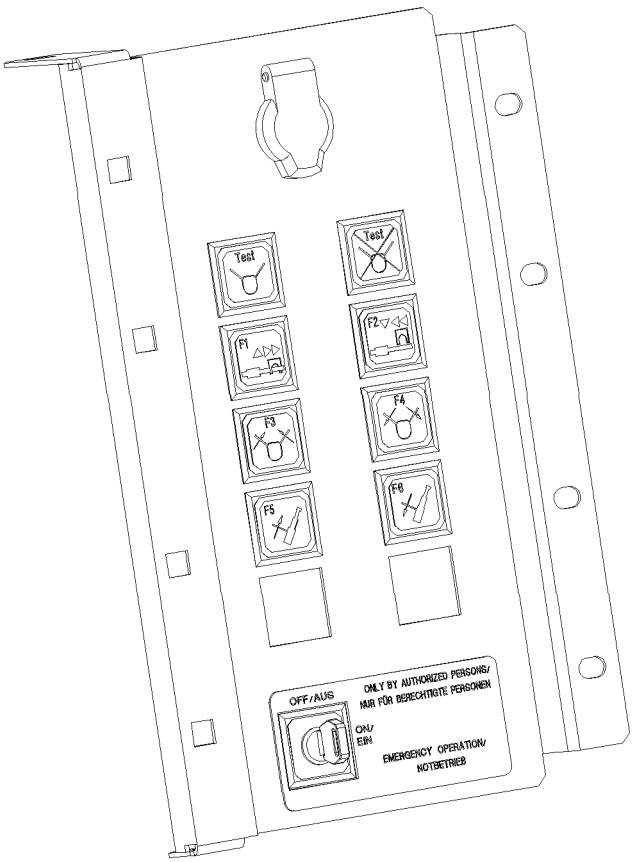
B197948

1.2 Evaluating the blinker code

☞ **Notice!**
Note
! For points 4-9 of the blinker code - see opposite illustration - the corresponding numbers of the LEC are issued by the number of repeat blinks.

	Description	Device		Error			
		(repeat blinks)		(repeat blinks)			
				path		type	
		10	1	10	1	10	1
1	Ignition “ON”						
2	Buzzer sounds (in case of error) **three times** (3x)						
3	**START** , next error or repetition						
4	(1st position LEC)	**0 .. 9 (3x)**					
5	(2nd position LEC)		**0 .. 9 (9x)**				
6	(3rd position LEC)			**0 .. 9 (4x)**			
7	(4th position LEC)				**0 .. 9 (2x)**		
8	(5th position LEC)					**0 .. 9 (1x)**	
9	(6th position LEC)						**0 .. 9 (5x)**
10	Pause 5 x 100 ms						
LEC		**3**	**9**	**4**	**2**	**1**	**5**

☞ **Notice!**
Note
! By stating the evaluated LEC (example: **3 9 4 2 1 5**) and the corresponding type number of the trailing axle, LIEBHERR Service can specify the cause of the error and provide tips for error remedy.


Test
Test
F1
F2
F3
F4
F5
F6
OFF/AUS
ONLY BY AUTHORIZED PERSONS/
NUR FÜR BERECHTIGTE PERSONEN
ON/
EIN
EMERGENCY OPERATION/
NOTBETRIEB

B195426

1 Test system, TY-guying*

With this crane, it is **not** possible to operate and observe the operating interface and the test system simultaneously.
Because of this, an option has been created to use the TY test system for remote diagnostics.

Danger!
Risk of accident!
It is strictly forbidden for the crane operator and crane personnel to operate the TY test system and use it for diagnostic purposes.

! The TY test system may only be operated and used for error diagnostics by authorized specialist personnel (LIEBHERR customer service).