

# **LCA 301.PDP**

## **Profibus Manual**

# **LCA 301**

**Appendix to the manual of  
the LCA 300/320**

Reg 10212/0899

Version 2/08.99

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Operator reference manual: LCA 301.PDP  
Version: 12. August 1999  
Person responsible: Lackenbauer

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## Suggestions for the user

Please read the reference manual before applying the unit first and store the manual at a safe location for later use.

**Target group** The reference manual is written for users with previous knowledge in PC and automation technology.

**Representation conventions**

[KEY]	Key inputs of the user are represented in square brackets, e.g. [CTRL] or [DEL]
Courier	Display outputs are printed in the Courier font, e.g. C: \>
<b>Courier bold</b>	Keyboard input to be made by the user are given in Courier bold, e.g. C:\> <b>DIR</b>
<i>Kursiv</i>	Names of buttons to be selected, menus or other screen elements and product names are printed in <i>Italics</i> .

**Symbols** The following symbols in the reference manual are used to mark certain text sections:



**Danger!**  
Possibly dangerous situation.  
Injury to persons can be the result.



**Attention!**  
Possibly dangerous situation.  
Property damages can be the result.



Tips and supplementary notes

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## Quality and support



In our company, quality comes first. From the electronics component up to the finished device, the quality assurance tests competently and comprehensively.

National and international test standards (ISO, TÜV, Germanischer Lloyd) are the basis.

Within 48 hours, every device passes a 100% check and continuous test under worst case conditions at changing temperatures (0... 50°C) and test voltages.

A guarantee for maximum quality.



Our products not only feature a maximum economic efficiency and reliability but also a comprehensive complete service.

You not only receive demo devices but we rather make specialists available who support you in person with your first application.

Qualified user consultation by competent sales engineers is obvious for us.

Our support is for you for the side with advice and deed every day.



We set up training programs and technical training for you in our modern training center or alternatively also in your house.

Request the current training catalog.



From the consultation up to the user support, from the hotline up to the service, from the reference manual up to the training an all covering and individual service for the entire product line is waiting for you.

Whenever you need us, we are there for you: dynamically, creatively and enormously efficiently. With the entire experience of a world-wide successful enterprise.

Telephone 07022/9660 -222, -132, -231, -230

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Systeme Lauer Active Area

(Download of Software, driver, manuals, Forum ...)

## Safety regulations



This reference manual contains the most important remarks in order to safely operate the device.

- This operator's guide, particularly the safety remarks are to be noted by all persons working with the device.
- Furthermore, the rules and regulations for the accident prevention applying to the application location are to be observed.
- Use as directed. The device is designed for the application in the industrial area.
- The device is manufactured to the state of the art and the official safeguarding regulations. Nevertheless, due to the application, dangers or impairments can result to the machine or to material assets.
- The device meets the requirements of the EMC guidelines and harmonized European standards. Any hardware-related modification of the system can influence the EMC behavior.
- The device may not be used without special protective measures in the hazardous area and in plants requiring a special monitoring.
- Do not heat up the buffer batteries. Danger of explosion. Serious burnings can be the result.
- The installation and operation may only be performed by trained personnel.
- The operating voltage of the device may only be in the specified ranges.
- You find information on this on the type plate and in the specifications of this reference manual.

## Standards

The PCS is manufactured to the state of the art and meets the requirements of following guidelines and standards:

- EMC guideline 89/336/ EEC
- EMC specialist basic standard EN50081 part 2 Noise Emission in The Industrial Area
- EMC specialist basic standard EN50082 part 2 Interference Resistance in The Industrial Area
- European Extra Low Voltage Guideline 73/23/EEC

The mounting and connection instructions described in this documentation are to be observed.

The conformity is confirmed by attaching the CE sign.  
The EC conformity declarations can be asked for at:

Systeme Lauer GmbH & Co KG  
P.O. Box 1465  
D-72604 Nürtingen





# Siemens PLC



## A Siemens PLC

### Contents of this manual

This manual relates exclusively to the use of the LCA 300.p or LCA 320.p Profibus-DP slave operating console (in the following designated as LCA 3xx.p) together with the LCAL2PST.S5D, LCAL2QST. S5D, LCAL2EST.S5D and/or LCAS7x.AWL programmable controller handling software.

The network setup was tested with a S5-115U (CPU 942, 943, 944, 945) and a S5-135U (CPU 928) together with a S5-DP IM308B master card (version 6), an IM308C (version 2), a CP5431 (version 3) and a S5-95U 8ME01/2 output. Together with a S7, the set-up was tested with a CPU 315-2 DP. In the following, the commissioning is described for this set-up.

The LCA driver is based on the Siemens SPC3 chip with Siemens object codes. Systeme Lauer can assume no responsibility for errors in and limitations due to the functionality of the Siemens software.

The programming of the Siemens programmable controllers, the Profibus master cards and the basic Profibus-DP functions are assumed as to be known.

### Which parts do I need?

The following products are required for a Profibus-DP network set-up (Systeme Lauer):

- LCA 3xx.p Profibus operating console.
- The LCAPRO configuration software and an LCA 733 programming cable.
- The LCA 301.PDP driver manual including LCA 301.SIE floppy disk.

The following products are required for a Profibus-DP network set-up (Siemens):

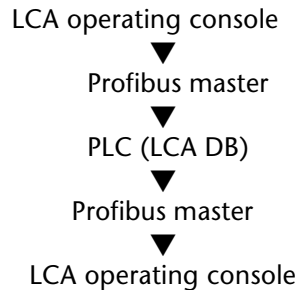
- A S5 or a S7-300 (406) programmable controller with Profibus-DP master.
- A Profibus-DP master plug-in card (only for S5), version IM308B (version 6), IM308C (version 2) CP5431 or S5-95U (8ME01 Rev.2).
- Programming software for the programmable controller and the master card.
- Profibus-DP network cable and bus connection connectors.

.... as well as power supplies for all components.

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### A.1 Basic data interchange

The communication link is established between the LCA and the programmable controller data area via the following communication partners:



#### LCA operating console

The LCA operating console determines the tasks to be executed (based on the enables, the display contents and the keys). The console sends these in a package to the Profibus master.

The master card stores the package in the input area of the programmable controller.

#### PLC

- The communication data block reserving 132 words (e.g. DB50) is located in the programmable controller.
- The task input buffer is located in an input area of the programmable controller.
- The task response buffer is located in an output area of the programmable controller.
- A cyclically selected handling block executes the tasks in the input buffer on the data block and stores the answer in the output buffer.

The master card retrieves the answer package from the output area of the programmable controller and submits it to the slave.

The LCA operating console evaluates the data and displays the answer in the display.

The inquiry/answer package is provided with an order number so that the answer always matches the inquiry.

#### A.1.1 Determination of the configuration

Everywhere, the settings must correspond for all parts working correctly together!

#### Master card

With the configuration of the master card, you determine the Profibus-DP network.

The following fixed settings apply for a LCA 3xx.p slave:

- 8 bytes for the input buffer and 8 bytes for the output buffer

#### A.1.2 Configuration of the master card (S5)

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You determine the settings of the Profibus-DP network in the COM ET 200 software. The data length of every slave must be defined there too.

IM308B

Version 6

To be able to define the LCA 3xx.p slave operating console, the "LASPC3 TD.200" file of the LCA 301.SIE floppy disk must be copied (README.TXT consider) to the COM ET 200 directory.

Take care that under DOS "LASTDRIVE" is set to "Z" before executing the software.

IM308C

Version 2 or higher

Copy the "LAUSPC3X.200" type data into the "Typdat5x" subdirectory.

CP5431

Set the slave interval times manually in the DP editor (values follow on the next pages).

IM308B

Now, select the COM ET200 software for an IM308B (version 6)...

ET200 parameter

- The baud rate should be in the range of 187.5 and 1500 Kbaud.
- The bus profile must be selected as "Standard Profibus-DP".
- The correct CPU type must be selected.
- No diagnosis is required.

Configuration parameter

- Here, you determine the slave parameters.
- Select the parameter file: "Lauer DP slave 5" for IM308B,
- Set the consistency to "0".
- For each slave, you should define 8...32 input bytes and 8..32 output bytes.

IM308C

For an IM308C, select the COMWIN10 software...

Bus parameters

Select Profibus-DP.

Host parameters

Select the used CPU type.

Master parameters

- Station type: IM308C
- Addressing type:

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You can select in the linear area of the P or Q area. The P or Q tiles are possible in the tile area. Then, select the number of the IM308C (0/16/32/48). Each IM308C can manage 16 tiles.

- Error message mode:  
Can be set to QVZ (acknowledgment delay on error).

### **Attention with acknowledgement delay!**

If during running-up, the LCA slave is not interfaced to the network then it is not linked to the network at a later point in time. Therefore, load the LCA correctly before you interface it to the Profibus network!

Without acknowledgement delay, a correct DP slave is linked to the network at any time!

- Access monitoring: on

### Slave parameters

- Select the "PCS\_LCA with SPC3" type file.
- In the linear area, you can select P000-P255 and/or Q000-Q255.
- In the P tile area, 0P192-15P255 is possible.
- In the Q tile area, 0Q0-15Q254 is possible.
- Enter 8 input bytes and 8 output bytes for each LCA slave.
- Sync or Freeze is not necessary.
- Activate the board consistency.

### Transfer

Now, program the EPROM cassette or the Flash module and plug it into your IM308 board.

### **Note the I/O address for programming the programmable controller.**

### CP5431

Call the SINEC.NCM (version 4.6) for a CP5431.

In contrast to the IM308 board, the CP5431 sends no configuration telegram. Thus, the settings on the board and on the LCA 3xx.p must correspond. Ensure that the DP is set to 8 input bytes and 8 output bytes.

The Profibus DP function may only be combined with asynchronous FMS services!

Use only the I/O area of bytes 0...127 in the 115U CPU 941-943 programmable controllers. Otherwise, inconsistencies can appear.

Please consider the following settings:

- CP init:

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Network file: NETWORK2NCM.NET

- Network parameters:

Default SAP: 61

- Peripheral I/O area:

DP update: cycle synchronized

Fill in the ZI/DP start (even) and ZI/DP end (odd) input and output areas.

- Peripheral/DP slave parameterizing:

Manufacturer ID: 0008

Sync mode: off

Freeze mode: off

- Peripheral/DP editor

Global data:

Largest min. slave interval: 2 x 1 ms

Min. poll scan time: 1 x 10 ms

Access monitoring time: 20 x 10 ms

Set the interface correspondingly. Perform a network adjustment with the "NETWORK2NCM.NET" file and transfer your data base file into the CP5431.

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### A.1.3 Configuration of the L2-DP network (S7)

Sinec L2-DP network

A Sinec L2-DP network consists of DP master and DP slaves that are connected by a bus cable and communicate with each other via the DP protocol (remote peripheral).

DP master

As DP master you can insert:

- a CPU with fixed built-in or pluggable DP master interface (fixed built-in, e.g. CPU 315-2 DP)
- an interface module that is associated to a CPU/FM (e.g. IF 964-DP in CPU 488-4)
- a CP together with a CPU (e.g. CP 342-5: this is parameterized with a special software that is called in STEP 7).

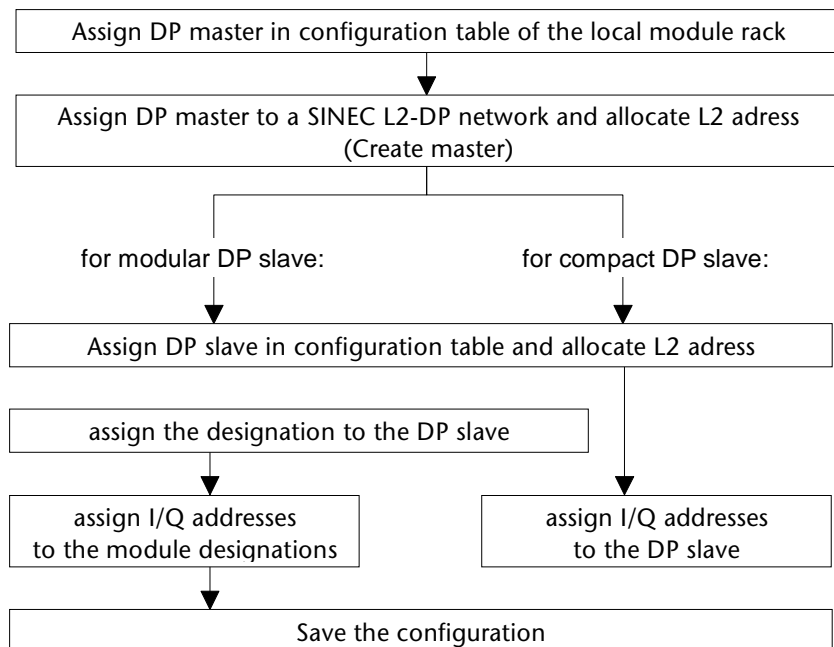
DP slaves

As DP slaves you can insert:

- boards with built-in digital/analog I/O channels (compact DP slaves, e.g. ET 200B, PCS 807 or LCA 3xx.p)
- interfacing modules with associated S5 or S7 modules (modular DP slaves, e.g. ET 200M).

Procedure

Basically, you configure a SINEC L2-DP network just as in a central set-up. Go ahead as follows:



Mapping in the configuration table Assign the DP master centrally to a rack. Allocate the DP slaves to an own configuration table. Switching to this configuration table is performed only if you have configured the DP master.



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### A.1.4 Structuring a master system

- Requirement  
You have selected the configuration table.
- Master system  
All DP slaves that are associated to a DP master form a master system along with the DP master. A master system is part of a SINEC L2-DP network.
- Creating a master system  
Create the relevant master system after you have arranged the DP master in the configuration table.  
Creating a master system means that you associate the DP master to a SINEC L2-DP network and assign an L2 address to the DP master.
- Select and arrange a DP master  
Select a DP master from the board catalog and assign it to the configuration table.  
Result:  
if the DP master is a built-in interface on a CPU, then a "+" is displayed on the left side of the CPU. A second line is displayed with the DP master if you click onto it.

#### Further procedure:

If you have arranged the DP master in the configuration table then can you either:

- continue with the allocation of "central" boards in the configuration table or,
- continue to configure the SINEC L2-DP network by associating the DP master to a SINEC L2-DP network and assign it an L2 address.
- L2 address  
You must assign an L2 address to each DP master and DP slave of a master system for the clear identification in the SINEC L2-DP network.

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- Network assignment and L2 address assignment

Go ahead for the network assignment and L2 address assignment as follows:

1. Mark the line in which the DP master is located.
2. Select the EDIT → Master system → Open menu command. A dialog field for the network and L2 address assignment is displayed.
3. Assign the DP master to a SINEC L2-DP network to (a default network is offered).
4. Assign an L2 address to the DP master (the lowest free L2 address is offered as default value).

Result:

the "Master system configuration table" is displayed after the assignment of the SINEC L2-DP network and the L2 address.

- Master system configuration table

In the master system configuration table, arrange all DP slaves of a master system and parameterize them.

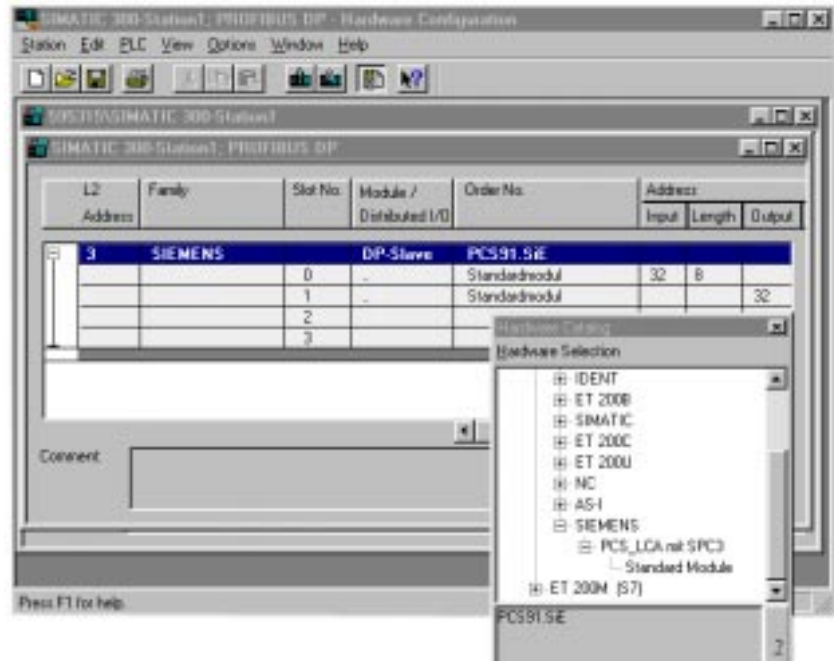
- Select and arrange a DP slave

Go ahead as follows to arrange a DP slave in the configuration table:

1. You must make the type file available:
  - From the PCS 91.SIE floppy disk, copy the LAUSPC3X.200 file into your STEP7\ S7DATA \TYPDATEI directory. Open the configuration table. Call the Extra → Update type files menu command. Close your application now and restart STEP 7. The type file is now entered in the hardware catalog.
2. From the hardware catalog, select the PCS\_LCA DP slave with SPC3 (you find it under ProfibusDP\Normslave\Siemens).
3. Arrange the DP slave in the configuration table.
 

STEP 7 automatically presents a list field with free L2 addresses. The next free L2 address is proposed to you as default value.
4. Assign the L2 address.

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- Associate boards to the modular DP slave

Go ahead just as if you arrange boards in a local configuration to associate boards to a modular DP slave. Please take note that the DP slave must be opened before you can associate boards (click onto "+").

Now, insert 2 default modules.
- Assign identifications to the modular DP slave

Identifications are assigned to modular DP slaves. In the DP ID, the characteristics (like address ranges and data consistency) of the boards are encoded.

The DP ID appears automatically if you insert the board into the configuration table. You can edit the DP ID by double-clicking onto the DP ID line.
- Assigning I/O addresses

Each I/O of a DP slave is associated exactly one address that is used to address the input/output. Therefore, you must assign a start address to each board/DP ID of a DP slave.

STEP 7 automatically assigns default addresses when you insert the board/the DP slave in the configuration table. The default addresses and their length are entered into the "I ADR." and/or "OADR." and "Length" columns.

Enter 8 input and 8 output bytes for each slave.



**Tip!**  
Note the I/O addresses for programming the programmable controller!

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### A.2 Commissioning

**In the following, "FC" is valid instead of "FB" for a S7 application.**

You find the "README.TXT" file in the ROOT directory of the LCA 301.PRF floppy disk. There, the relevant handling block is described for each project. For a first test of the connection, load the handling block for the Profibus-DP project into the programmable controller. It is LCAL2 PST.S5D for the P area, LCAL2QST. S5D for the Q area, LCAL2 EST.S5D for the I/O area and LCAS7x.AWL of a S7. With a S7, load the mnemonic list file as S0 object (source) and compile it. Edit the FB201 and FB202 (S7: FC 101 and FC 102) and adjust the assignment to the used LCA. Remove the stop command! The LCA data block must be created or loaded into the start OB.

For each LCA 3xx.p slave operating console, link a call of the FB203 handling block ("LCAPROFP" for the P area and "LCAPROFQ" for the Q area) and "LCAPROFE" for the I/O area in your programmable controller program. Link the FC 103 for the S7. Set the P or Q tile if you use these before calling the FB203. With these call parameter you determine:

- **UBDB**  
the name of the data block, e.g. DB50
- **RXFA**  
the location of the input buffer (like master card), e.g. KF +40 (S7: location of the inputs)
- **TXFA**  
the location of the output buffer (like master card), e.g. KF +50 (S7: location of the outputs)
- **RSET**  
the restart input, e.g. E0.0
- **TIMT**  
the name of the time-out timer, e.g. T5
- **TIMZ**  
the time-out time, e.g. KT 20.1 = 2 seconds (S7: S5T' 2s)
- **RFLM**  
the first scan flag, e.g. M10.0
- **EROR**  
the error flag, e.g. A0.0
- **COFF**  
the error block, e.g. FB202 (S7: FC 102)
- **INIT**  
the first initialization block, e.g. FB201 (S7: FC 101)

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Thus, the example is set to the following values:

- The input buffer is located from PY40 to PY47 or QB40 to QB47.
- The output buffer is located from PY50 to PY57 or QB50 to QB57.
- The time-out timer is timer T5 with a value of 2 seconds.
- The restart input is assigned to E0.0
- The error output is assigned to A0.0
- FB201 is selected in the first scan.
- FB202 is selected only once for each communication loss.

### A.2.1 Parameterization of the LCA 3xx.p

During the configuration of the LCA, both the application program with data and a selected driver are transferred. The settings of the driver variables can be changed.

Variable time-out

The time-out time to be set is the time that the programmable controller needs at maximum to cyclical call the LCAPROFX communication program plus the communication time. The time is adjustable between 0.5 and 4 seconds - default is 1 second.

Variable LCA station number

This corresponds to the Profibus DP slave number. Therefore, it may be selected between 3 and 126. The default value is 3. This value is taken over during the powering up of the LCA. The LCA firmware must be transferred new for changing this value.

#### Transfer of the data record into the LCA

1. Apply operating voltage (19..33V) to the LCA. The COM-LED lights now.
2. Connect the programming interface of the PC to the LCA operating console using the LCA 733 programming cable.
3. Run the LCAPRO configuration software.
4. In the start selection, select the Siemens/Profibus driver
5. Create or load your data file.
6. Set the driver parameters under the *Project and Drivers* menu items. Basically, you can take over the default settings.
7. Transfer the compiled data record into the LCA.

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### A.2.2 Set-up and first powering up

Set up the configuration when you have configured all parts. Thereby, the following points should be considered:

- Profibus-DP network

Use only suited cable for wiring.

The last participant in the Profibus-DP network must have a terminator connected. Use the Siemens "SINEC L" bus connectors for this. Special bus connectors are required (Siemens order no.: 6ES7 972-0BA10-0XA0) for baud rates between 3 and 12MBaud.

For the LCA 320.p, also the Lauer terminals can be used instead of the Siemens bus connectors but only up to a maximum baud rate of 500 KBaud. You have to use the Siemens bus connectors in case you need a cable terminator. Connect the red cable to "A", the green cable to "B" and the cable screen to the screen symbol. Take care to use a cable strain relief (not for the LCA casing).

- Profibus master card

Search the correct slot for your board. Otherwise, the board may be damaged.

- Mechanical mounting of the LCA 3xx.p operating console

The LCA 320.p operating console must be grounded!

You can commission the components now in two steps:

#### Step 1: Network

- Set up the Profibus-DP network.
- Power up the programmable controller and the LCA 320.p operating console.
- Now, the IM308 "RN" LED lights and the "BF" LED flashes.
- After 5 seconds the latest the "BF" LED of the master card is deactivated and the green "Profibus COM"-LED on the rear panel of the LCA operating console lights statically.
- With the S7, the "SF-DP" and "BUSF" LEDs are deactivated.

#### Step 2: Logical communication

- Set the restart input of the programmable controller to "ON" or switch the programmable controller from STOP to RUN.
- The red "ERR" LED on the LCA front panel is deactivated after 2 seconds the latest.

### A.2.3 Demo project

A demo project for an IM308C is provided on the Siemens floppy disk to enable a simple entry into the Profibus-DP configuration. In this example a Profibus-DP network with an LCA operating console for the linear P area (bytes 0..7) is prepared. The commissioning procedure is exactly documented in the enclosed README.DOC file.

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### A.2.4 Trouble-shooting

#### PLC enters the STOP mode

- The stop commands in the handling software were not yet removed. Please remove those.
- Programmable controller STOP (QVZ) is set on Profibus-DP errors in the master configuration. Get the network running.
- The configuration of the master card is not compatible to the programmable controller. Please correct.
- IM308 does not enter the RUN mode or flashes.
- Wrong slot for the IM308. Please correct.
- Configuration data incorrect, not programmed or EPROM or Flash module is missing. Examine your data and the cassette.

#### PLC in RUN mode, the "BF" LED of the IM308 (S7: "BUSF" LED) flashes for more than 10 seconds

- Fault in the network configuration. Please correct.
- LCA operating console not ready because:  
Incorrectly connected. Please correct.
- LCA jumper on "Prog" (test operation and forced loading). Set jumper to "Auto".
- Not switch on. Apply 24V 10% supply voltage to the operating console.
- Wrong slave number. Set the slave number correctly and transfer project again into the LCA.

#### PLC in RUN mode, the "BF" LED of the IM308 (S7: "BUSF" LED) is OFF, the LCA "ERR" LED is ON

- In the programmable controller, the Profibus block is not executed. Please link.
- FB203 configuration is different to the master card or the LCA. Please check and correct if necessary.
- Time-out timer expired. Set restart input = 0. (UEROR:=RSET)
- A wrong driver was loaded into the LCA operating console. Transfer the correct driver together with the data record again into the LCA operating console.

#### PLC in RUN mode, the "BF" LED of the IM308 (S7: "BUSF" LED) is OFF, the LCA "ERR" LED is OFF but later ON again.

- The communication runs of course (LCA "ERR" LED is deactivated) but after a certain time the "ERR" LED starts to flash. This points out that the communication functions of course but a monitoring condition such as Time-out was not observed. Possibly, the restart input is also not set or the handling block is selected irregularly.

## A Siemens PLC

### A.2.5 Communication processing

#### LCA 3xx.p operating console Profibus-DP

The LCA 3xx.p operating console driver software is based on the object codes of the Siemens company. In addition, serial communication and logical evaluation was added.

During the first scan, the slave number set in the driver parameters is taken over. The firmware can then be interfaced to the Profibus-DP network as independent slave.

#### Set-up of the logical communication

The Profibus-DP communication uses the Siemens I/O area. Depending on the programmable controller, the size is between 128 bytes and several Kbytes (tiling). A Profibus-DP master must be available in the programmable controller for the communication.

The configuration of the slave operating console is determined in the master card. If a wrong configuration is submitted to the LCA then the Profibus configuration (not CP5431) runs of course but there will be no logical data interchange.

The driver in the LCA operating console splits the occurring tasks in part tasks. Together with an order number, each part task is enclosed in a package. This package is stored in the I area of the programmable controller. A programmable controller expander program reads the package and applies the contained instruction to a DB. The result is stored in the O area with an inversed order number. From there it is submitted to the LCA operating console.



#### Tip!

For the LCA DB please take note that the useful data area only starts at DW4! Thus, the LCA byte 0,1 is located in DW4, LCA byte 8,9 is located in DW8, etc.

Currently, the realized transfer time is approx. 30 ms per task package. Since the reading of the LCA area is distributed across several transfers, an area reading time of approx. 300 ms is reached. However, a key will be transfer within 30 ms! Therefore, with an only shortly pressed key, the releasing of a key can appear before the "LED read" task which results in a non-display of the LED.

#### Visual control

- Green "Profibus communication" LED on the rear panel. The LED is OFF with no active communication. The LED flashes if a baud rate was recognized. The LED is ON with a data interchange taking place on the Profibus network.
- Red "Communication" LED on the LCA front panel. This LED is OFF with the logical communication being active.

#### Optimal configuration

The tasks of the LCA operating console depend on the display content. Avoid gaps in the variables and message area. Allocate the variables directly after the message area.



## A Siemens PLC

### A.3 Specifications

Description	<ul style="list-style-type: none"> <li>• LCA 300.p or LCA 320.p Profibus-DP slave operating console</li> </ul>
System requirements	<ul style="list-style-type: none"> <li>• Profibus-DP standard network according to DIN 19245</li> </ul>
System assignments	<ul style="list-style-type: none"> <li>• 8 bytes in the input area of the PLC</li> <li>• 8 bytes in the output area of the PLC</li> </ul>
Additional interface	<ul style="list-style-type: none"> <li>• 9-pin JD connector with RS-485 interface for Profibus connection</li> </ul>
Additional displays	<ul style="list-style-type: none"> <li>• 1 green LED for the Profibus communication state</li> </ul>



**TIP!**

All other specifications correspond to the specifications in the LCA 300/320 manual.

## A Siemens PLC

# Bosch PLC



## B Bosch PLC

### B.1 Profibus connection to Bosch PLCs (using the CL 400 as an example)

This section relates exclusively to the use of the LCA3X0.P Profibus-DP together with the SIEL2DME PCS driver and the Lauer Profibus handling software.

The network configuration was tested with all LCA types, a ZS400-CPU and a DESI-DP master card. In the following, the commissioning of this set-up is described.

The LCA3X0.P is based on the Siemens SPC2/SPC3 chip with Siemens object code. Systeme Lauer can assume no responsibility for errors in and limitations due to the functionality of the Siemens software.

The programming of the Bosch programmable controllers and the Profibus master cards as well as the basic Profibus-DP functions are assumed as known.

Which parts do I need?

The following products are required for a Profibus-DP network set-up (Systeme Lauer):

- LCA 3X0.P.
- The LCAPRO configuration software and a PCS 733 programming cable for the LCA text display.
- The LCA 301.PDP manual including the PCS 91.BOS floppy disk.

The following products are required for a Profibus-DP network set-up (Bosch):

- A CL400 programmable controller.
- A Profibus DESI-DP or DESI-DP12 master card.
- Programming software for programmable controller and master card.
- Profibus-network cable and bus connectors.

... as well as power supplies for all components.

## B Bosch PLC

### B.1.1 Configuration of the (DESI-DP) master card

Everywhere, the settings must correspond for all parts working correctly together!

Type file

Copy the "LAUERDP.GSD" file into your BOSCH.BIB directory. This file is required for the master file to be created and contains the configuration functions of the LCA 3X0.P slave. Now, run the Profi software of the master card. Select the DP software with F3. Create a new project or use the supplied LCADP project. Select the editor with F2. In the BTN overview, select the PCS 807 type. Select the configuration matching your application under the Modules group. (Length of the transfer buffer in bytes). Specify the slave address of the LCA. Now, change to the BTN DETAIL window with F5. Enter the desired input and output bytes for the communication.



**Note!**

The fixed number of I/O bytes needed for the communication totals 8 bytes respectively.

You can use also the extended inputs and outputs. Make sure that they are in an ascending order. Otherwise, the handling block does not understand the communication commands.

For the data interchange, the DESI-DP master card requires link a buffer of 6 bytes in size. Set the start address of the link buffer in the *Bus master settings* menu.

Load the master file into the master card. Take note, that the set baud rate of the software and the set baud rate of the master card match.



**Note!**

Note the set size of the inputs and outputs, their start addresses and all other settings. The specifications are required for the handling block or for the DIL-switch settings of the master card.

## B Bosch PLC

### B.1.2 Hardware settings using the DESI-DP card as an example

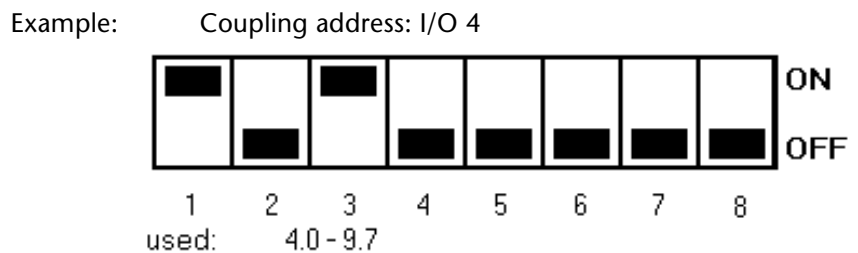


Note!

See also the Bosch DESI-DP Bus master manual.

- Settings the link address with the S4 DIL-switch:
  - Switch 1 of S4 is used for selecting the address range.
    - ON I/O-area
    - OFF IZ/OZ-area

The other switches of S4 are used for setting the start address, refer to the following figure.



## B Bosch PLC

You set the desired transmission rate with the S5 DIL-switch. The PCS 807 slave module is thereby adjusted automatically.

Baud rate	Switches			
[kBaud]	1	2	3	4
9,6	OFF	OFF	OFF	OFF
19,2	ON	OFF	OFF	OFF
93,75	OFF	ON	OFF	OFF
187,5	ON	ON	OFF	OFF
500	OFF	OFF	ON	OFF
1500	OFF	ON	ON	OFF

All DIL-switches of S3 are set to OFF in the test configuration.



### Note!

Possibly other settings are required by other boards (see DESI-DP12) for the master station address. Please refer to the corresponding manuals of the master card.



## B Bosch PLC

### B.1.3 "LCADP" handling software

For the evaluation of the received data, the "LCA\_KOMM" block is required for performing the data exchange with the LCA DB. Furthermore, an initialization block (INIT) and an error block (COFF) are provided. In this block you can define the data word default assignments or the emergency assignments. Furthermore, an OB1 example is provided in which the call of the block is implemented. The files are stored on the PCS 091.BOS floppy disk in the Profibus directory.



#### Note!

In the OB1, the first input word of the master link buffer must be specified as the first output word of the link buffer. This is required for the CPU-DP master synchronization.

#### Parameters of the LCA\_KOMM block:

The block requires 12 parameters. This enables the free choice of the addressing.

In OB1, you find an example (refer to the handling software print-out).

The meaning of the parameters is as follows:

- P0: PCS user DB. (256 words for PCS data)
- P1: Start address of the selected Profibus input bytes
- P2: Start address of the selected Profibus output bytes
- P3: Restart input or reset flag - required for restarting the communication after a communication fault  
(Set the input to permanently high for an automatic restart)
- P4: Timer for time-out monitoring
- P5: Timer time as constant
- P6: Communication error output (after a communication fault, the output is set to high)
- P7: PB of the "INIT" block
- P8: PB of the "COFF" block
- P9: Required flag (freely selectable, may not be used by other program parts)
- P10: Required flag (freely selectable, may not be used by other program parts)
- P11: Required flag (freely selectable, may not be used by other program parts)

## B Bosch PLC

### B.2 Commissioning

Set up the configuration when you have configured all parts (without voltage being applied).

Thereby, the following points should be considered:

- Use only suited cable for wiring.
- The last participant in the Profibus-DP network must have a terminator connected. Special bus connectors are required.

Go ahead as follows for powering up:

- Power up the programmable controller and the LCA 3X0.P.
- After 5 seconds the latest the "SEND" LED of the master card is activated and the green "COM" LED of the LCA 3X0.P operating console lights statically.
- Set the restart input of the programmable controller to "ON" or switch the programmable controller from STOP to RUN mode.
- The red "ERR" LED of the LCA is deactivated after 2 seconds the latest.

#### B.2.1 Trouble-shooting

##### PLC enters the STOP mode

- The stop commands in the handling software were not yet removed. Please remove.
- Configuration of the master card is not compatible to the programmable controller. Please correct.

##### PLC is in RUN mode, "SEND" LED is OFF

- Fault in the network configuration
- Multibox not ready - caused by:
  - wrong slave address, check whether master file corresponds to the address.
  - an "in reset state" condition (DIL-switch 10 is set to ON), set switch DIL 10 to OFF.
  - no supply voltage - provide the Multibox with voltage.

## B Bosch PLC

### **PLC in RUN mode, "SEND" LED is ON, status message 01**

- Programmable controller in STOP mode, switch the programmable controller to the RUN mode
- Network fault, ascertain that all participants are correctly configured. Check the communications cable.
- Link error (CPU is not synchronized with master card), ensure that the start input word of your selected link buffer is cyclically copied to the start output word.

### **PLC in RUN mode, "SEND" LED is ON, no status message, LCA "ERR" LED is ON.**

- The Lauer handling block is not selected in the programmable controller. Please link with correct parameters.
- A wrong driver was loaded into the LCA. Transfer the data record with the correct driver again into the LCA text display.

### **PLC in RUN mode, "SEND" LED is ON, no status message, "ERR" LED is OFF but later ON again.**

- The network configuration was not synchronized with all participants. Switch off all involved devices. Restart all devices.
- The network set-up is located in a noisy environment. Take appropriate measures.

## B Bosch PLC

### B.2.2 Handling software printout

Table of contents

B1	OB1	Master block
PB4	LCA_KOMM	Expander program for LCA
PB2	INIT	Initialization block
PB3	COFF	Error block

```

;*****
;      OB1
;*****
; Filename: OB1
; Function: Organisationsbaustein

;*****
;      P r o g r a m
;*****
L      W      EZ64,A          ; copy the first word of your I/O-Area of the
T      W      A,AZ64         ; CPU - DESI-DP coomunication from input to
                               ; to output

;*** call the Lauer communication subroutine PB4 ( LCA_KOMM )

BA      PB4,12              ; call expander program
P0      W      DB1          ; DB LCA-datafield of 132 words
P1      W      &EZ10        ; startadress of the Profibus-Input (8 bytes)
P2      W      &AZ10        ; startadress of the Profibus-Output (8 bytes)
P3      B      E0.3         ; B restart input
P4      W      T1           ; T Watch-Dog LCA communication
P5      W      K4.2         ; K timevalue for „watch dog“
P6      B      M100.0       ; B output-bit communication error
P7      W      PB2          ; PB INIT (communication init LCA)
P8      W      PB3          ; PB COFF (communication error LCA)
P9      B      M100.2       ; B for internal use
P10     B      M100.3       ; B for internal use
P11     B      M100.4       ; B for internal use

;U      B      M100.0       ; communication error to output
;=      B      A3.7

PE                               ;program end

```

## B Bosch PLC

```

;*****
;   LCAKOMM
;   expander-program for communication via Profibus with LCA STARLINE
;*****
; Filename: LCA_KOMM
; function: expander for the C1400
;
;
;*****
;   D e c l a r a t i o n
;*****

; subroutine parameter
;~~~~~
;BA      -LCA_KOMM,12
;P0  W   DB1      ; DB  LCA-datafield of 132 words
;P1  W   &EZ50    ; startaddress of the Profibus-Input (8 bytes)
;P2  W   &AZ50    ; startaddress of the Profibus-Output (8bytes)
;P3  B   E0.3     ; B   restart input
;P4  W   -TIMER   ; T   Watch-Dog LCA-communication
;P5  W   K4.2     ; K   timevalue for „watch dog“
;P6  W   M100.0   ; B   output-bit for communication error
;P7  W   -INIT    ; PB  INIT (communication init LCA)
;P8  W   -COFF    ; PB  COFF (communication error LCA)
;P9  W   M100.2   ; B   for internal use
;P10 W   M100.3   ; B   for internal use
;P11 W   M100.4   ; B   for internal use

;*****
;   p r o g r a m
;*****

;*****
;
; processor reset => reset BT9_KOM
;~~~~~
U    B    SM20.0
O    B    SM20.7
SPB  -START_KO ; ----->
BX   P0

U    B    P10      ;second cycle to catch whole data (inputs)
SPB  -WAITDAT1
U    B    P11      ;second cycle to write whole data (outputs)
SPB  -WAITDAT2

; no process if timeout and restart input = 0
;~~~~~
UN   B    P3      ; timeout ?
U    B    P6      ; restart ?
BEB

; instruction-number = 0 => wait for instruction-number = n,
; if instruction-number = n => process received data
;~~~~~
XO   W    B,B      ; A Register = 0
L    W    P1,A     ; instruction-number = 0 ? Input
L    BY   [A],A
VGL  BY   A,B
SPZ  -NO_AUFTR    ; ----->
BX   P0          ; open LCA-DB

```

## B Bosch PLC

```

; instruction-number > 0 => process the instructions
;
;*****

;*****
; Have the whole instruction received ?

L   BY   DX3,B           ; old instruction-number in byte 3
L   W    P1,A           ; load instruction-number (input)
L   BY   [A],A
VGL BY   A,B           ; compare old with new
SPZ          -NO_AUFTR   ; if even -> no new instructions
L   W    P1,A           ; load address of receive inputs
L   BY   [A],B         ; load instruction-number 1.byte
ADD  W    K07H,A       ;
L   BY   [A],A         ; load instruction-number last byte
VGL BY   A,B           ; compare first with last
SPN          -NO_AUFTR   ; if not even -> instructions are not
                          ; complete
;*****
;
UN   B    P9           ; set wait-flag and wait one cycle

=   B    P10
BE
      -WAITDAT1
U   B    P9           ;reset the wait-flag
=   B    P10

L   W    P1,A         ; indir.address of datainputs
ADD  W    K1H,A       ; at byte 2 load first instruction
L   W    P2,B         ; indir.address of dataoutputs
ADD  W    K1H,B
L   W    K2H,D         ; reset receive-counter
T   BY   D,DX2        ; DX2 = receive-counter

;=====
; analyse of the instructions

      -read_new   ; < - - - -
L   BY   [A],C       ; read actual instruction

PUSH W    C
ADD  W    K1,A
L   BY   [A],C
T   BY   C,D
U   BY   KFOH,C
VGL BY   K10H,C      ; read instruction
SPZ          -READ ; ->
VGL BY   K20H,C      ; write „word“ instruction
SPZ          -WRITE   ; ->
VGL BY   K40H,C      ; write high byte instruction
SPZ          -WRITE_LB ; ->
VGL BY   K80H,C      ; write low byte instruction
SPZ          -WRITE_RB ; ->
POP  W    C
SP          -AUFT_END ; no instruction

```

## B Bosch PLC

```

=====
; read instruction: copy data from LCA-datafield to send-outputs
=====

      -READ ; <--
POP   W    C
PUSH  W    A                ; pointer receive inputs to stack

L     BY   C,A              ; load LCA-dataword-address
U     W    K00FFH,A
SLL   W    A,1              ; * 2
O     W    K1800H,A        ; add to indirect address LCA-datafield
L     BY   D,C              ; load instruction
U     BY   K0FH,C           ; mask count of datawords

      -return_r ; < - -          ; copy until count of datawords = 0
VGL   BY   K0H,C
SPZ           -r_end        ; read instruction end
INC   W    A,1
L     BY   [A],D            ; load highbyte from LCA-datafield
T     BY   D,[B]           ; write to send-outputs
DEC   W    A,1
INC   W    B,1              ; increment send pointer
L     BY   [A],D            ; load lowbyte from LCA-datafield
T     BY   D,[B]           ; write to send-outputs
INC   W    B,1              ; increment send pointer
INC   W    A,2              ; increment datafield-address
DEC   BY   C,1              ; decrement dataword counter
SP           -return_r ; - - >

;~~~~~
      -r_end
POP   W    A                ; load from stack receive pointer

SP           -AUFT_END

;
                                end read instruction
=====

;=====
; write word instruction: copy datawords from receive inputs to datafield
=====

      -WRITE ; <--
POP   W    C
PUSH  W    B                ; send pointer to the stack

L     W    C,B              ; load LCA-dataword-address
U     W    K00FFH,B
SLL   W    B,1              ; * 2
O     W    K1800H,B        ; add to indirect address LCA-datafield
L     BY   D,C              ; load instruction
U     BY   K0FH,C           ; mask count of datawords
PUSH  W    C                ; dataword counter to the stack
INC   W    A,1              ; increment receive pointer

      -return_w ; < - -          copy until dataword counter = 0

```

## B Bosch PLC

```

VGL  BY  KOH,C
SPZ  -w_end          ; write instruction end
INC  W    B,1        ; receive address of high byte
L    BY  [A],D       ; load byte from receive inputs
T    BY  D,[B]       ; and store it as high byte
DEC  W    B,1        ; receive address of low byte
INC  W    A,1        ; increment datafield address
L    BY  [A],D       ; load byte from receive inputs
T    BY  D,[B]       ; and store it as low byte
INC  W    A,1        ; increment datafield address
INC  W    B,2        ; increment receive pointer
DEC  BY  C,2        ; decrement dataword counter
SP   -w_end          ; - - >

;~~~~~
      -w_end
POP  W    C          ; load from stack dataword counter
POP  W    B          ; load from stack send pointer

SP   -AUFT_END      ; ——>

;                                     end write instruction
;=====

;=====
; write high byte instruction: copy high byte of dataword to the datafield
;=====

      -WRITE_LB    ; <—
POP  W    C
PUSH W    B          ; send pointer to the stack

L    W    C,B        ; load LCA-datword-address
U    W    K00FFH,B
SLL  W    B,1        ; * 2
O    W    K1800H,B   ; add to indirect address LCA-datafield
L    BY  D,C        ; load instruction
U    BY  K0FH,C      ; mask count of datawords
PUSH W    C          ; dataword-counter to the stack
INC  W    A,1        ; increment receive pointer

      -return_1    ; < - -          ;copy until dataword counter = 0
VGL  BY  KOH,C
SPZ  -lb_end        ; write high byte instruction end
INC  W    B,1        ; receive address of high byte
L    BY  [A],D       ; load byte from receive inputs
T    BY  D,[B]       ; and store it as high byte
INC  W    A,2        ; increment receive pointer
DEC  BY  C,1        ; decrement dataword counter
SP   -return_1      ; - - >

; is there another instruction ?
;~~~~~
      -lb_end
POP  W    C          ; load from stack dataword counter
POP  W    B          ; load from stack send pointer

SPZ  -AUFT_END      ; ——>

;                                     end write high byte instruction
;=====

```



## B Bosch PLC

```

;=====
; write low byte instruction: copy high byte of dataword to the datafield
;=====

        -WRITE_RB    ; <---

POP     W     C
PUSH    W     B           ; send pointer to the stack

L       W     C,B           ; load LCA-dataword-address
U       W     K00FFH,B
SLL     W     B,1           ; * 2
O       W     K1800H,B       ; add to indirect address LCA-datafield
L       BY    D,C           ; load instruction
U       BY    K0FH,C         ; mask count of datawords
PUSH    W     C           ; dataword-counter to the stack
INC     W     A,1           ; increment receive pointer

        -return_b     ; copy until dataword-counter = 0
VGL     BY    K0H,C
SPZ     -rb_end           ; write low byte instruction end
INC     W     A,1           ; receive address of low byte
L       BY    [A],D         ; load byte from receive inputs
T       BY    D,[B]         ; and store it as high byte
INC     W     A,1           ; increment receive pointer
DEC     BY    C,1           ; decrement dataword counter
SP      -return_b    ; - - >

; is there another instruction ?
;~~~~~
        -rb_end
POP     W     C           ; load from stack dataword counter
POP     W     B           ; load from stack send pointer

SPZ     -AUFT_END

;
;                                     end write low byte instruction
;=====

;=====
; AUFT_END: all instructions are done
;=====
        -AUFT_END    ; <-----
L       W     P1,A
ADD     W     K5H,A
L       BY    [A],A
T       BY    A,DX9
L       W     P1,A
ADD     W     K6H,A
L       BY    [A],A
T       BY    A,DX8

UN     B     P9           ; wait one cycle to be sure that
=     B     P11          ; all outputs are refreshed

BE

; Invert instruction-number and write it to the first and last byte
; of the communication outputs

```

## B Bosch PLC

```

;~~~~~
      -WAITDAT2
U   B   P9           ; reset wait-flag
=   B   P11

L   W   P1,A
L   BY  [A],D       ; load instruction-number
T   BY  D,DX3       ; store it in byte 3
XO  BY  KFFH,D      ; invert the instruction number
L   W   P2,A
T   BY  D,[A]       ; store it in the first and last
ADD W   K7H,A       ; output bytes
T   BY  D,[A]

; watch dog
;~~~~~
; trigger timer
;-----
U   W   P5,D        ; timevalue
U   B   SM30.3
SE          D,P4    ;

U   B   SM31.1      ; Watchdogmerker reset
R   B   P6

BE           ; ----->
;                               end instructions
;=====
;*****

;=====
; no new instructions
;=====
      -NO_AUFTR      ; <-----

L   W   P5,D        ; timevalue
U   B   SM31.1
SE          D,P4

U   B   P4          ; timeout ?
BEI

; set fault   watch dog has responded
;~~~~~
      -KOMM_FEL

S   B   P6           ; watch dog
XO  W   D,D

; init aftzer communication error
;~~~~~
BA          P0       ; open LCA-DB
BA          P8       ; COFF

BE           ; ----->
;                               end watch dog
;*****

```

## B Bosch PLC

```

=====
; start of communication
=====
      -START_KO
; start timer
;~~~~~
L      W      P5,D          ; timervalue
U      B      SM30.3
SE          D,P4

; reset fault
;~~~~~
U      B      SM31.1
R      B      P6          ; watch dog

XO      W      D,D

; init output at the first cycle
;~~~~~
L      W      P2,A
T      W      D,[A]      ;

; INIT LCA-DB at first cycle
;~~~~~
BA          P0
BA          P7

BE          ; ----->
;          end start communication
;*****

;Programm Ende

;*****
;** INIT: Subroutine INIT inits the LCA-Datafield at the first cycle
;**          The user can program its own specifications
;*****

HLT      ;!!!! Here you have to specify your init values
;*****
;***** !!!!! at least set your
;*****          Key-bytes to zero

;**** example for LCA ****
;L      BY      K0D,A
;T      BY      A,D6          ;TASTEN
;T      BY      A,D7
;T      BY      A,D8
;T      BY      A,D9

BE

```

## B Bosch PLC

```

;*****
;** COFF: Subroutine COFF inits the LCA-Datafield after communication error
;**      ( emergency case ) The user can program its own specifications
;*****

HLT      ;!!!! Here you have to specify your emergency values
;*****
;*****
;*****          !!!!! CAUTION !!!!!
;*****          at least set the Key-Bytes to zero
;*****
;***** example for LCA *****

;L      BY      K0D,A
;T      BY      A,D6 ;operator text
;T      BY      A,D7 ;keys
;T      BY      A,D8 ;printer status
;T      BY      A,D9 ;key-event

BE

```

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