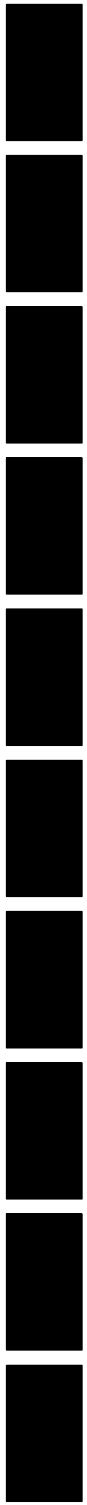
PRO → U120

User Manual
A91M.12-271956.06-0894

PRO → U120
Type: PRO-U120
Version 5.1

Configuration Instructions
DOK-276566.06-0894

Part of Software Package E-No. 424-275117



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Application Note

Caution The relevant regulations must be observed for control applications involving safety requirements.
For reasons of safety and to ensure compliance with documented system data, repairs to components should be performed only by the manufacturer.

Training
AEG offers suitable training that provides further information concerning the system (see addresses).

Data, Illustrations, Alterations
Data and illustration are not binding. We reserve the right to alter our products in line with our policy of continuous product development. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us by using the form on the last page of this publication.

Addresses
The addresses of our Regional Sales Offices, Training Centers, Service and Engineering Sales Offices in Europe are given at the end of this publication.

Terminology

Note This symbol emphasizes very important facts.

Caution This symbol refers to frequently appearing error sources.

Warning This symbol points to sources of danger that may cause financial and health damages or may have other aggravating consequences.

Expert This symbol is used when a more detailed information is given, which is intended exclusively for experts (special training required). Skipping this information does not interfere with understanding the publication and does not restrict standard application of the product.

Path This symbol identifies the use of paths in software menus.

Figures are given in the spelling corresponding to international practice and approved by SI (Système International d‘ Unités).
I.e. a space between the thousands and the usage of a decimal point (e.g.: 12 345.67).

Abbreviation	Explanation
ALU	ALU 200/201
A-byte	Address byte in SEAB-1F
A1-byte	Subaddress byte in SEAB-1F
AWD	Automatic selection
IL	Instruction list
BGT	Subrack
D1-, D2-, D3-, D4-byte	1st - 4th data byte in SEAB-1F
DM	Double-point information
I/O module	Input/output module
EZM	Real-time information
F-byte	Function byte in SEAB-1F
GRW	Limit value
KOS	KOS 201/210
MW	Measurand
NLQ	Near Letter Quality
PV-Number	Process variable number
UST	Outstation

Objectives

This description is intended for configurers of Geadat U120 outstations.

The configurer is then able to
- ❒ install the programming device,
- ❒ install the software,
- ❒ configure with the software,
- ❒ document the configuration,
- ❒ pass the parameters obtained,
- ❒ transfer the generated IL to the controller and start it.

Arrangement of This Guide

Part I Check list how to proceed in order to start operations with an outstation.

Part II Description of the main menu PRO-FWT.

Part III This part describes how to configure the Geadat U120 outstation with PRO → U120.

Part IV This part describes how to parameter the KOS 201/210 directly or with PRO → U120.

Part V File Structures

Part VI contains the index.

Part VII contains the user comments and the list of addresses.

Relevant documentation

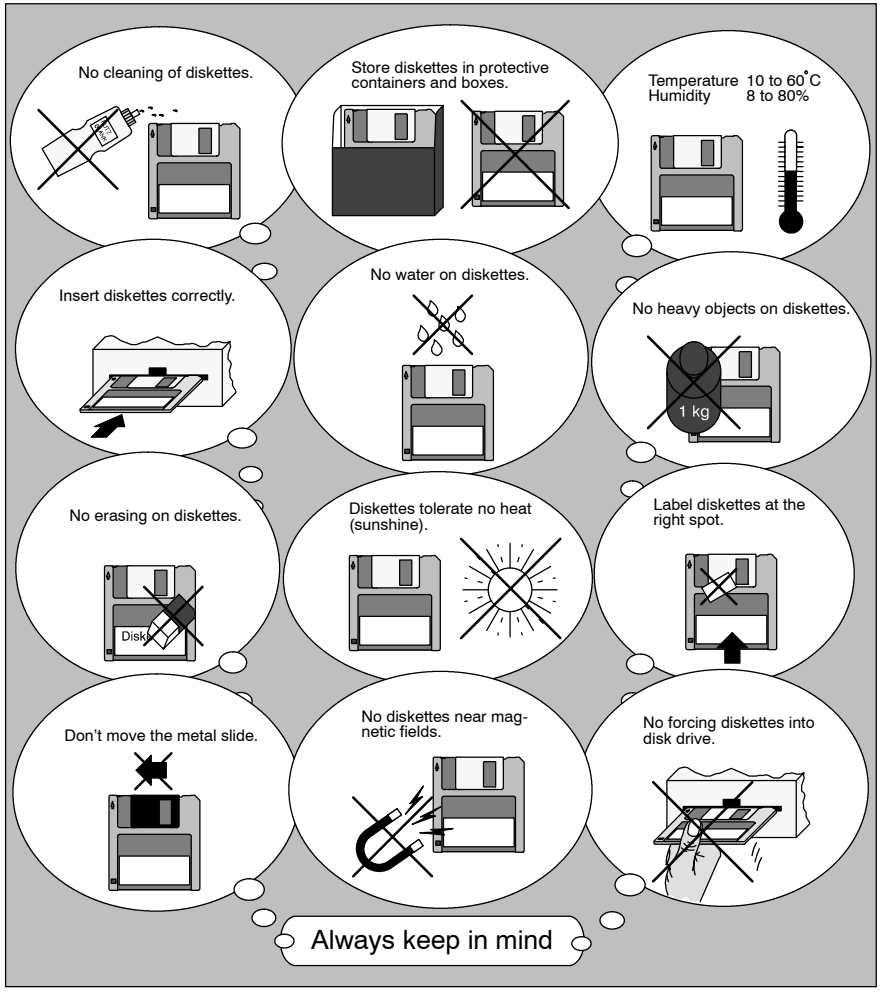
Geadat U120 User Manual
Dolog AKF → A120 User Manual

Validity

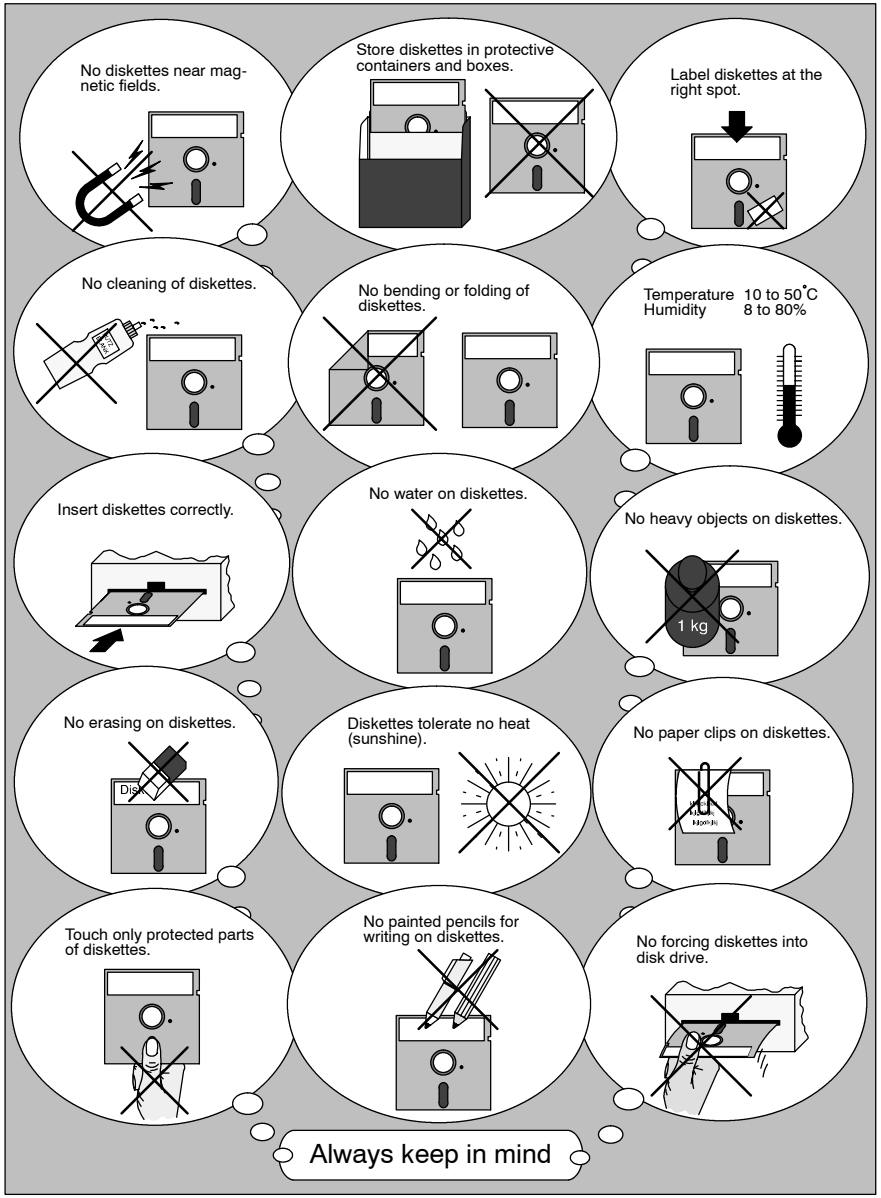
This description is valid for the:

Software	PRO → U120, Version 5.0		
	Dolog AKF → A120, Version 5.0		
Basic software versions	ALU 200	276 689.00	
	ALU 201	276 690.00	
Firmware package:	KOS xxx	FPM 001	277 782.01
containing		FWM 001	275 125.06 (SEAB)
		FWM 002	275 126.01 (APS)
		FWM 007	261 541.00 (SEAB 8k RP)
		FWM 008	261 142.00 (AWD 8k RP)

Handling 3 $^{1}/_{2}$” Diskettes



Handling 5 1/4" Diskettes



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Part I
How to proceed

Chapter 1
Check List

Step by step procedures for

- configuration
- parametering and programming
- system start-up

of a Geadat U120 outstation are defined here using check lists.

1.1 Check list configuration

Before you begin configuration of your U120 outstation with the software package PRO → U120, you should look at the following check list and read the detained information in the corresponding chapters.

- ❒ Check whether the required softwre environment is available for the configuration aid PRO → U120 (Part III, Chap. 1.2)
- ❒ Check whether the hardware environment fulfills the requirements (Part III, Chap. 1.2)
- ❒ Install the configuration aid PRO → U120
- ❒ Familiarize yourself with the functions of the operating keys and with mouse operation (Part III, Chap. 2.3 and 2.4)
- ❒ Start the configuration aid via the main menu PRO → FWT (Part II, Chap. LEERER MERKER and Part III, Chap. 5.1.2)
- ❒ Go to the data input level (Part III, Chap. 5.2)
- ❒ Enter the system names and the outstation numbers in the menu “project data” (Part III, Chap. 5.2.1)
- ❒ Check whether the basic settings in the menu “general outstation data” agrees with your requirements. If necessary make modifications (Part III, Chap. 5.2.2)
- ❒ Enter the required number of data points and let PRO → U120 make an equipment and assignment suggestion (Part III, Chap. 5.2.3)

or

- ❒ Select a subrack and define the equipment and data point assignment yourself (Part III, Chap. 5.2.4 and 5.2.5)

- ❒ If necessary, enter the limit values for monitoring the measurands (Part III, Chap. 5.2.6)
- ❒ If necessary, enter the data for the control blocks (Part III, Chap. 5.2.6)
- ❒ Call the IL generation (Part III, Chap. 5.4)
- ❒ Archive the system on diskette (Part III, Chap. 5.3)
- ❒ Print the documentation (Part III, Chap. 5.5)

1.2 Check list parametering and programming

When you have terminated configuration, you can begin parametering the KOS and programming the ALU.

- ❒ Call the KOS parametering using the ZOOM function in PRO → U120 (Part III, Chap. 5.2.5)
- ❒ Check whether the SEAB parameters are set correctly for your requirements (Part IV, Chap. 2.2.2)
- ❒ Check whether the KOS parameters are set correctly for your requirements (Part IV, Chap. 2.2.3)
- ❒ Check the entries in the individual assignment lists (Part IV, Chap. 2.2.4)
- ❒ Archive the parameters on diskette (Part IV, Chap. 2.3)
- ❒ Print the documentation (Part IV, Chap. 2.5)
- ❒ Generate a KOS-firmware-EPROM (Part IV, Chap. 2.6)

❒ Transfer the parameters online to the KOS (Part IV, Chap. 2.4). However, this is only possible if the KOS is already equipped with a firmware-EPROM.

or

❒ Generate a parameter-EPROM (Part IV, Chap. 2.6)

❒ Leave the KOS parametering and return to the PRO → U120 main menu

❒ Install the programmable controller station (Part III, Chap. 5.5)

❒ Leave the configuration aid PRO → U120 and return to the PRO → FWT main menu

❒ Call the function “read ASCII-IL” (Part II, Chap. 1.3.1)

❒ Call Dolog AKF → A120 (Part II, Chap. 1.3.2)

❒ Program the programmable controller online

or

❒ Generate a PC*-EPROM

☞ **Note** At the first startup of an ALU 201 the basic software have to be loaded to the ALU.

1.3 Check list system start-up

- ❒ Insert the KOS firmware and parameter-EPROM
- ❒ Insert the ALU-EPROM or the EPROM module
- ❒ Check whether the switches or jumpers of the individual modules are set correctly.
- ❒ Insert and wire modules

The KOS and the ALU can also be parametered or programmed online with the PADT. The KOS must in any case be equipped with the firmware-EPROM.

Further information about system start-up can be found in the Geadat 120 user manual.

Part II
Main Menu PRO → FWT

Chapter 1
Operating

1.1 General Information

The PRO-FWT main menu enables you to choose individual software packages required for starting up a Geadat telecontrol station without having to return to the DOS level.

☞ **Note:** Of course only the software packages which were installed can be called.

☞ **Note:** This main menu is always installed with the individual software packages PRO... It is started from the operating system level with the call “PRO-FWT”.

Operation:

You can select one of two kinds of operator interface.

- Pulldown menues
- Icons

The interface can be set with the >Desktop<.

Both interfaces can be used with the cursor keys and with the mouse.

The individual menues or functions are called by clicking with the left mouse key or with RETURN. In pulldown menus, the call can also be made using the reference characters, which are displayed in a different color.

The menu window is closed with ESC or by clicking.

Passive functions are displayed in the pulldown menu without a reference charcter and in a different color. These cannot be selected or are skipped with the cursor.

Example: The program is in graphic mode; only a switch to text mode is now possible. After switching, the graphic mode function is active and the text mode function is passive.

1.2 Expert system PRO...

The 120-series includes the expert systems:

- PRO-U120 for outstations with Modnet 1F
- PRO-UZ120 for submaster stations with Modnet 1F
- PRO-Z120 for master stations with Modnet 1F
- PRO-U121 for outstations with Modnet 1W (in preparation)

The 250-series contains the expert systems:

- PRO-U250 for outstations with Modnet 1F (in preparation)
- PRO-UZ250 for submaster stations with Modnet 1F (in preparation)

1.3 Dolog AKF...

The two software products AKF12 and AKF25 are provided for programming the telecontrol stations.

The 120-series can be programmed with AKF12. The 250-series can be programmed with AKF25.

☞ **Note:** The Dolog AKF... software has large space requirements. If you loaded memory-resident programs or operator interfaces, the remaining main memory may not be sufficient for Dolog AKF. In this case the functions “Read in ASCII-IL” and “Call” cannot be executed. Leave PRO-FWT and remove the call of these programs from the “AUTOEXEC.BAT” or the “CONFIG.SYS” and make a warm restart (<Ctrl>+<Alt>+<Del>). Th en start PRO-FWT and select “Read in ASCII-IL” or “Call” again.

1.3.1 ...Read in ASCII

With this call, the particular AKF reads in a control file generated by PRO-Tool (AKF12.CMD or AKF25.CMD).

The AKF station is set up using this control file and the ASCII-IL generated by PRO-Tool is read in.

The station which was last processed with a PRO-Tool by the function “Set up PC* Station” or “Generate ASCII Import Files for AKF” is always processed.

1.3.2 ...Call

Dolog AKF can be started directly by PRO-FWT with this call. All the Dolog AKF functions can be executed.

If you only use the standard IL of PRO... and have no special IL blocks, you can limit yourself to the following function calls:

- set up link to PLC
- boot basic software (does not apply to ALU 200)
- link IL
- load IL into RAM of ALU and start

or

- program IL on EPROM
- print out IL

The exact instructions can be found in the Dolog AKF A120/A250 user manual.

Caution: The PRO-Tools assume Dolog AKF A120 version 5.0.

1.4 Tele Tools

These tools can be used together with special PC plug-in cards to simulate master stations and outstations.

Teleview:

For Modnet 1F/1N together with PC-V24, PC-GDUE, PC-WT

TEL001

For Modnet 1F/1N and AWD together with PC-AWD1

TEL002

For Modnet 1W together with PC-AWD1

1.5 Desktop

Language

You can switch directly between German and English.

Screen

PRO-FWT can run as required in graphic mode or in text mode with an EGA or VGA card. For all other screen adaptors, there is an automatic switch to text mode and this setting cannot be changed.

In graphic mode you can also define whether PRO-FWT should work with icons or only with pulldown menues.

You can choose one of three color representations both in graphic and in text mode. For clarity you should choose two-tone representation for some PCs. The pulldown menues have a light background for “black-and-white”, and a dark background for “inverse black-and-white”.

Version numbers

The current data (part number, version, date) are entered in a version file when the individual PRO-tools are installed. The file is displayed on the screen with this function.

The display is in a scroll box, i.e. it can be shifted up/down with the cursor or by clicking the cursor fields with the mouse cursor.

AKF Program Path

In order to be able to work with different AKF versions, the program path of the required AKF12 and AKF25 version can be entered here. The default entries used by PRO-FWT are the default settings of the AKF installation program. The subdirectory in which the AKF12.EXE or AKF25.EXE are located, including the drive identifier, must be defined as program path.

Example: C:\AEG-A91\AKF12
C:\AEG-A91\AKF12V5
D:\AKF125

You must make sure that a backslash '\' is entered after the drive identifier in order to specify the program path from the basic directory. The current entries are stored when you leave PRO-FWT and are available again during the next call.

PRO-FWT always works with the current program paths in the calls "Read in IL" and "AKF..Call".

Part III
Configuration Instructions

Chapter 1
Introduction

1.1 Program package PRO → U120

The program package PRO-U120 consists of

- disks with the configuration software
- a disk with the conversion program
- a disk with the KOS firmware
- the user manual

1.2 System requirements

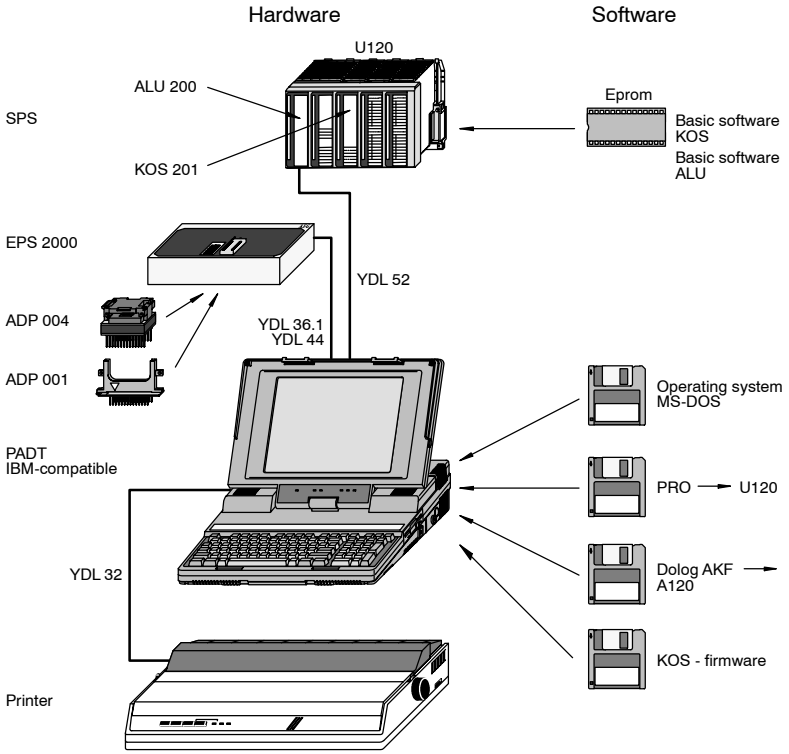


Figure 1 Components for configuration and programming

1.2.1 Hardware

PUTE IBM-compatible PCs with hard disk and 640 Kbyte main memory. A guarantee is only given for AEG devices.

Printer (with parallel interface)
DRU 292/293
DRU 120
DRU 096
DRU 1200
PRT 294/295

EPROM programming station
EPS 2000

Programming adaptor
ADP 001
ADP 004

1.2.2 Software

- DOS Version 3.2, 3.3, 5.0
- Dolog AKF → A120 Version 5.0
- KOS firmware

1.3 Installation

Installation PRO → U120

Switch on device (operating system level) Display ”C>”.

Step 1 Diskette 1 in diskette drive A or B

Step 2 Installation routine with call ”A:INSTAL” or ”B:INSTAL”, depending on the drive selected, and start <Cr>.

Step 3 Now follow the instructions of the installation program.

1.4 New Features

1.4.1 Compared to PRO-U120 V 4.0

☞ **Note** It is essential that you observe the remarks about the update version in Part III, chapter 1.5.

Control file

A control file was introduced in Dolog AKF - A120 version 5.0 for the call by PRO-FWT. This version of the software package PRO ... creates a corresponding file and thus controls the flow in the call ”Read in ASCII-IL”. The software package is no longer compatible with older AKF12 versions.

Clock time management in KOS firmware

The message ”Minute pulse missing” can be suppressed with parameters (Part IV, chap. 2.2.3).

The running reserve for the time management can be set to 1, 26 and 50 hours with parameters (part IV, chap. 2.2.3).

ALU battery status

The status of the ALU batteries is transferred in the two most significant bits of the management signal A1 = 0.

8K ring buffer in U120

The firmware diskette contains two new firmware variants in which a ring buffer of 8K (messages) is implemented. The hardware module KOS 202 (E-No. 278 918) is required here (part IV, chap 2.2.3).

- FWM007 (261 541) SEAB-1F (Modnet 1F)
- FWM008 (261 542) AWD

1.4.2 Compared to PRO-U120 V 5.0

4 master stations for AWD operation

The outstation can now be called with a maximum of 4 master stations (part IV, chap. 2.2.5).

GA-bits

A GA-bit can be configured for each message (part IV, chapter 2.2.4).

Running reserve

The running reserve can now be set to 5 hours.

1.5 Update version

If you have received an update version of the expert software PRO-U120, you should pay attention to the following instructions prior to the installation:

As of version 2.0, the software is installed in the subdirectory "\PRO-FWT\PRO-U120".

Old versions (1..3) of the expert software will not be overwritten or deleted.

The main menu PRO-FWT will be installed anew and will only call the new expert systems:

- PRO-U120 as of version 4
- PRO-Z120 as of version 2
- PRO-UZ120 as of version 2

If you also want to call the old versions of the expert systems from a main menu, you have to save the program PRO-FWT.EXE already installed under a different name before the installation. The program is located in the root directory.
Example: COPY C:\PRO-FWT.EXE C:\PRO.EXE
The old versions can now be selected by calling PRO.

Data will be saved in a new path and under a new name (see chapter 3.3). If you want to be able to edit stations created by PRO-Z120, versions 1..3, using version 4, you have to install the conversion
program included in the package and start it.

Installation instructions:
Insert the disk with the conversion program into drive A or B and start the installation with A:INSTAL or B:INSTAL.

The program will be installed in the root directory and can be started from there by entering "KONVERT". The conversion only has to be performed once.

Chapter 2
Overview And General Information

2.1 Summary of Features

PRO → U120 supports the user in the configuration and start-up of the Geadat U120 outstation.

- A subrack including the module assignment is automatically determined by specifying the data points
- A selected hardware (subrack and I/O modules) and their data point assignments can be selected
- Special features can be assigned to the data points
- Control blocks can be defined
- An instruction list (IL) is generated based on the parameters entered
- Transfer of instruction list to Dolog AKF → A120
- Transfer of generated parameters to KOS 201/210 with EPROM or by transfer to KOS-RAM.
- Files can be generated for a bottom-up configuration (e.g. for PRO-Z120, PRO-UZ120)

- Documentation of system by printing
  - Bill of materials
  - Hardware configuration
  - Data point reference list
  - Table of limits for measurands
  - KOS 201 parameters
  - Control blocks
  - General outstation data
- Archiving on hard disk or diskette of the files entered and generated

2.2 Rough structure

Data input (Chap. 5.2)

- Project Data
- General Datas of Outstation
- Number of Data Points
- Selection of Subracks
- Module and Subrack Assignment
- Special Processing of the Data Points
- List of Data Points
- Edit Library

Archiving (Chap. 5.3)

- Read Data
- Save Data
- Delete File
- Change Drive

IL-generation and transfer (Chap. 5.4)

- Start IL Generation (German)
- Start IL Generation (English)
- Create PLC Station And Copy ASCII-IL

Printer output (Chap. 5.5)

- Bill of Materials
- Hardware Configuration
- Table of Measurand Limits, Analog Extreme Values
- List of Data Points
- General Datas of Outstation, Loading
- Control Blocks
- All Lists
- Selection of Printers
- Printer Output to File

Screen Output of Bill of Materials (Chap. 5.6)

KOS 201 Parametering (Part IV)

2.3 Keyboard operation

If a command is specified in pointed brackets < > in the following description, this means that the corresponding key should be pressed.
<Cr> = Press RETURN key.
<Alt> + <Ctrl> + <Del> = Warm restart, all three keys are pressed simultaneously.
<F1> → <F3> = the function keys F1 and F3 are pressed one after the other.

Caution	US keyboard	German keyboard
	<Esc>	**<Eing lösch>**
	<Ctrl>	**<Strg>**
	<Home>	**<Pos1>**
	<End>	**<Ende>**
	<Prtsc>	**<Druck>**
	<PgUp>	**<Figure ↑ >**
	<PgDn>	**<Figure ↓ >**
	<Ins>	**<Einf>**
	<Del>	**<Entf> oder <Lösch>**
	<Return>	**<Übernahme> (auch <Enter> oder < ↵ >**

Function keys

The individual submenues are selected with the function keys.

There is always a return to the previous menu level with <F9>.

Help is always called with <F10>.

Arrow keys (cursor keys)

The parameters are selected or modified in some menues with these keys.

Caution If your PUTE does not have a separate cursor block, make sure that the key <Num Lock> is switched off as otherwise the number block is active.

<Return> key

The input in the line editor is terminated or the selected parameter is accepted with this key.

<Esc> key

There is a return to the previous menu level with this key.

Toggle

Different settings can be selected by pressing the <Return> key repeatedly.

2.4 Mouse operation

The right mouse key corresponds to ESC or F9.

Menu call:

Set the mouse cursor to the red (inverse) function key fields and click with the left key.

Selection within the menu:

Set the mouse cursor to the desired input line or selection field and click with the left mouse key.

Set the module or slot location in the menu ”I/O-module selection” in this way and then delete or set by clicking the red (inverse) function fields.

A selected module can also be entered by twice clicking a subrack location.

File selection window:

Select the system or file with the mouse cursor and click with the left mouse key. If the mouse cursor is set to the upper or lower free line in the window and clicked, the scroll function is carried out if necessary.

Setting the mouse cursor to the text RETURN and clicking activates the corresponding RETURN function.

2.5 General information

- The following symbol specifies how to select the described function.
  Counting always starts with the main menu.
  The brackets contain the function keys which must be pressed in the main menu.

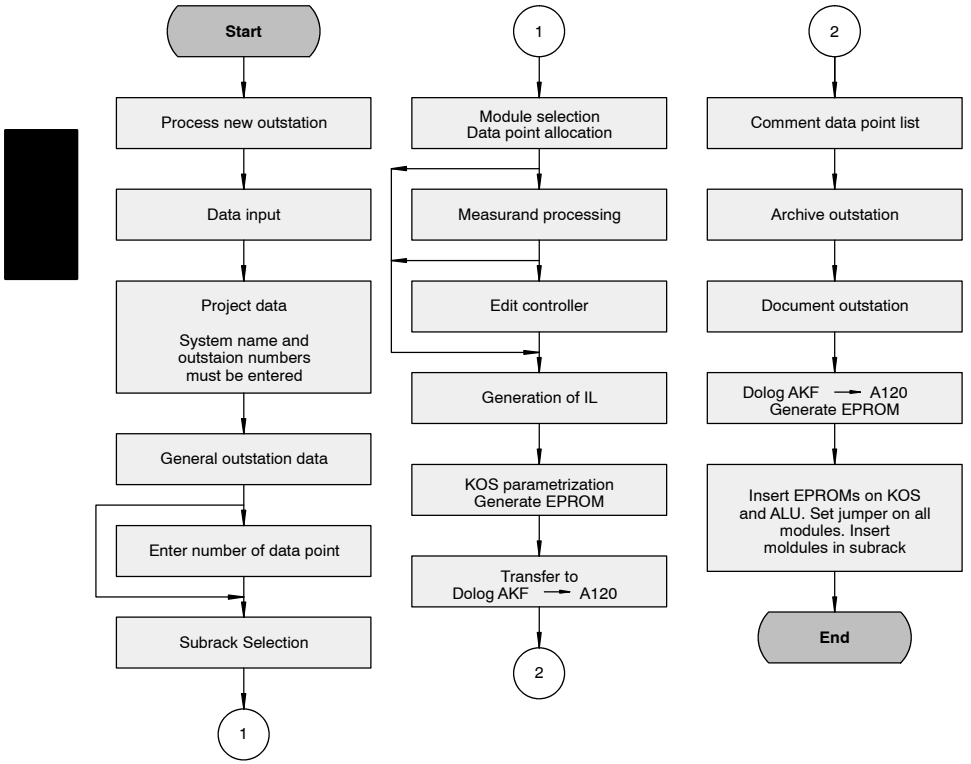
  Example:
  “Data input”,”Subrack selection”
  (F1 → F4)

- The specifications Ex By in the titles are also included in the lower right corner of the screen pages. They display the menu level and menu image.
  In this way the relevant chapter for a particular screen page can easily be found using a cross reference list.

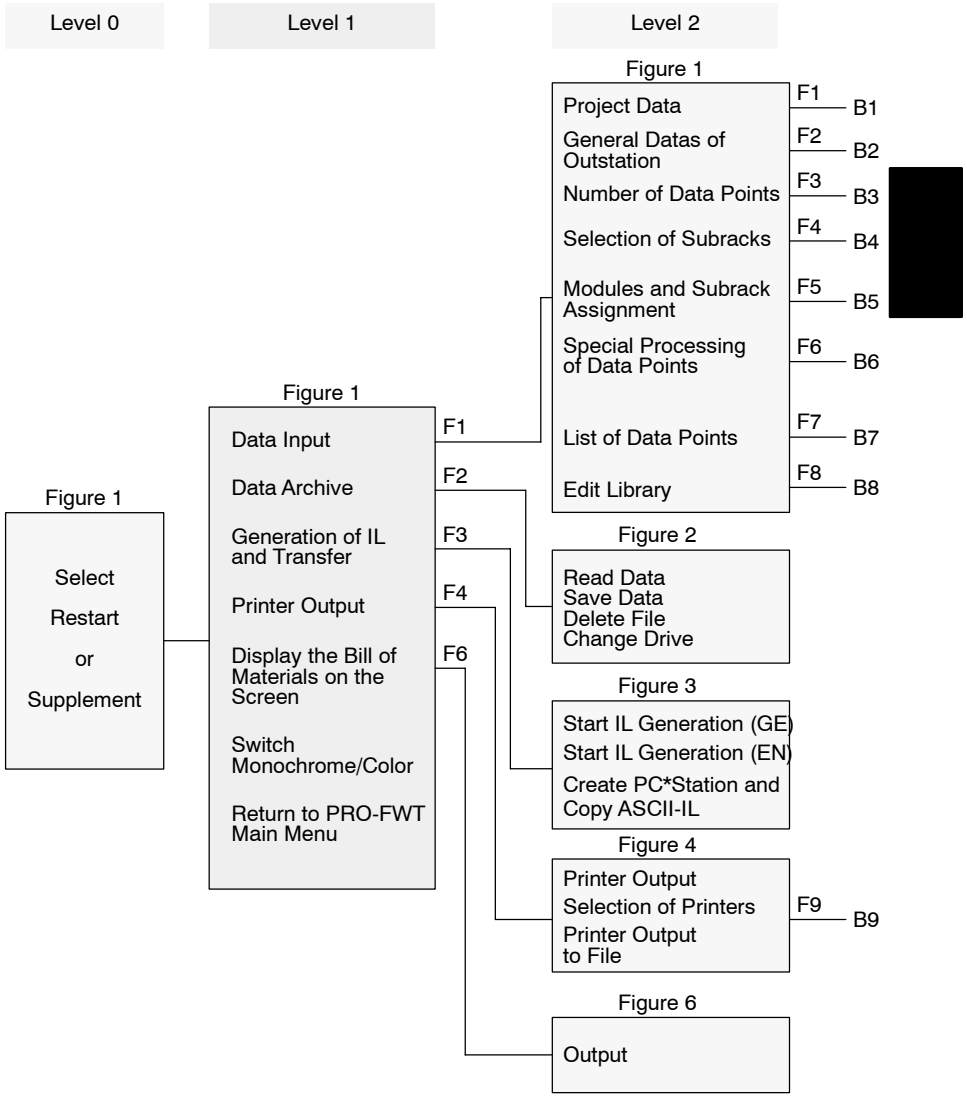
- Remark window:
  If an incorrect input is made when configuring with PRO → U120 or if a limit is exceeded, this is displayed on the screen with the corresponding output. In order to delete this remark window from the screen, press any key. You can then correct the input and continue with configuration.

Chapter 3
Overview How To Work

3.1 Flow Chart



3.2 Tree Structure of the Menues



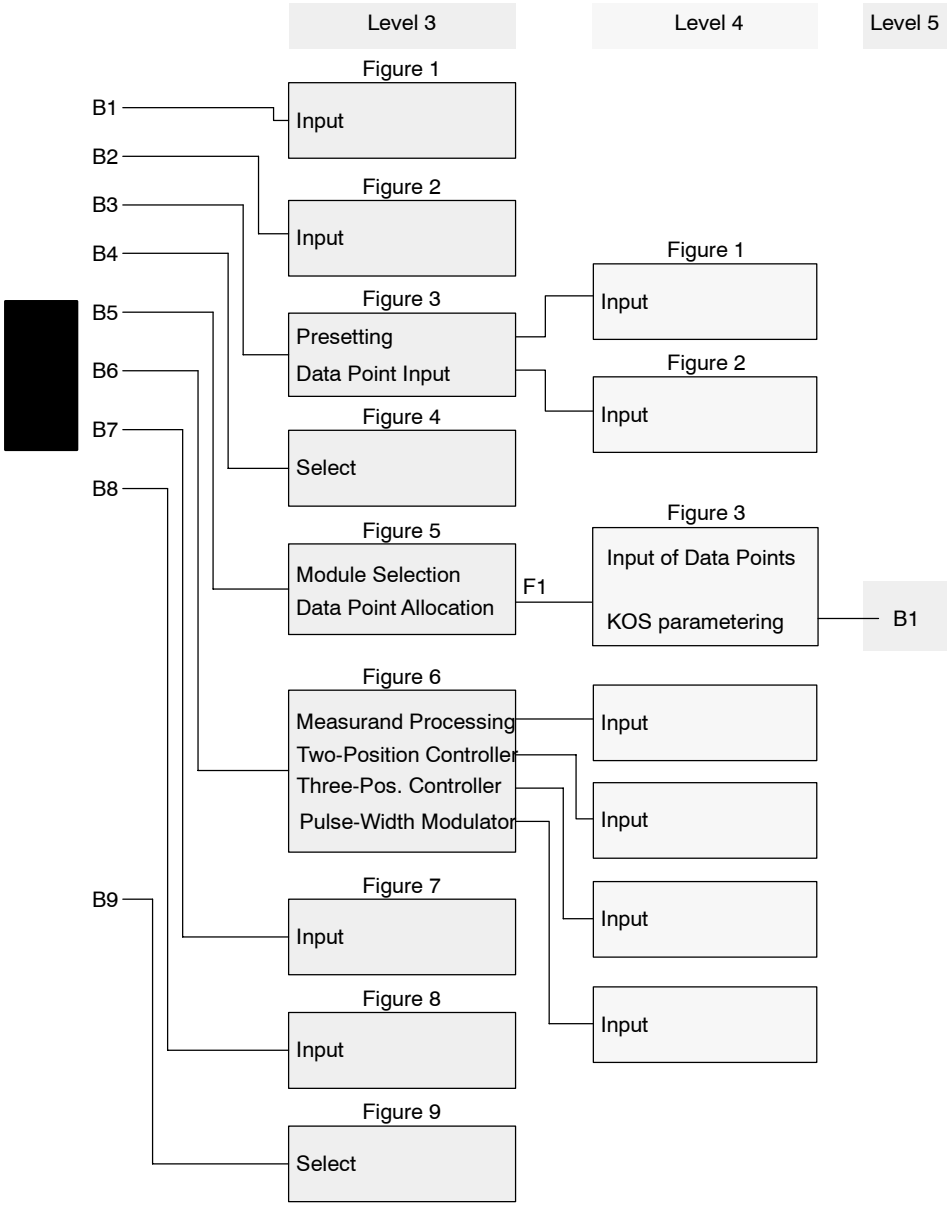

Level 3
Level 4
Level 5
Figure 1
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Figure 2
Input
Figure 3
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Data Point Input
Figure 4
Select
Figure 5
Module Selection
Data Point Allocation
Figure 6
Measurand Processing
Two-Position Controller
Three-Pos. Controller
Pulse-Width Modulator
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Input
Figure 8
Input
Figure 9
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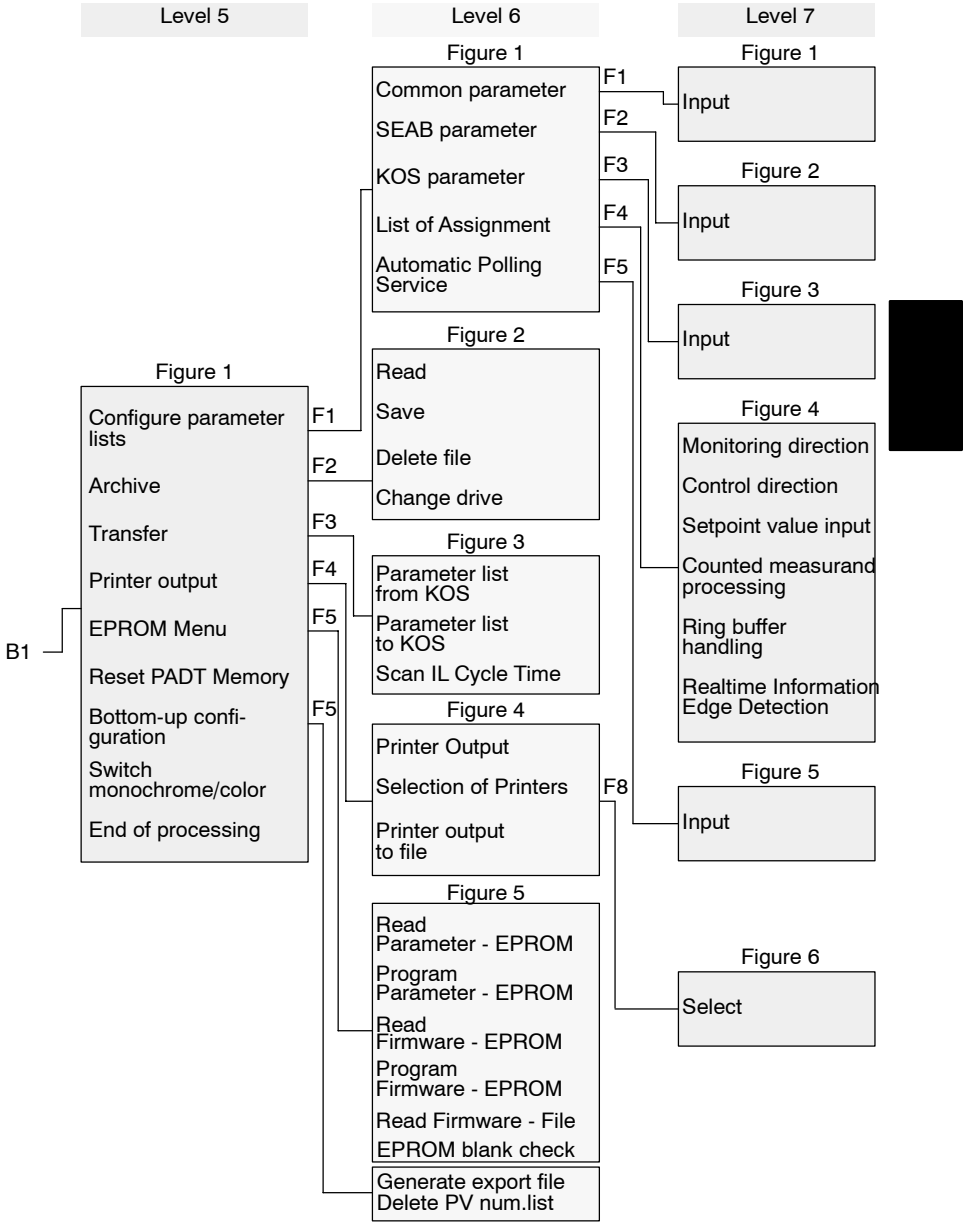
B2
B3
B4
B5
B6
B7
B8
B9
Figure 1
Input
Figure 2
Input
Figure 3
Input of Data Points
KOS parametering
F1
B1
Input
Input
Input
Input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Level 6
Level 7
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Counted measurand processing
Ring buffer handling
Realtime Information Edge Detection
Figure 5
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Figure 6
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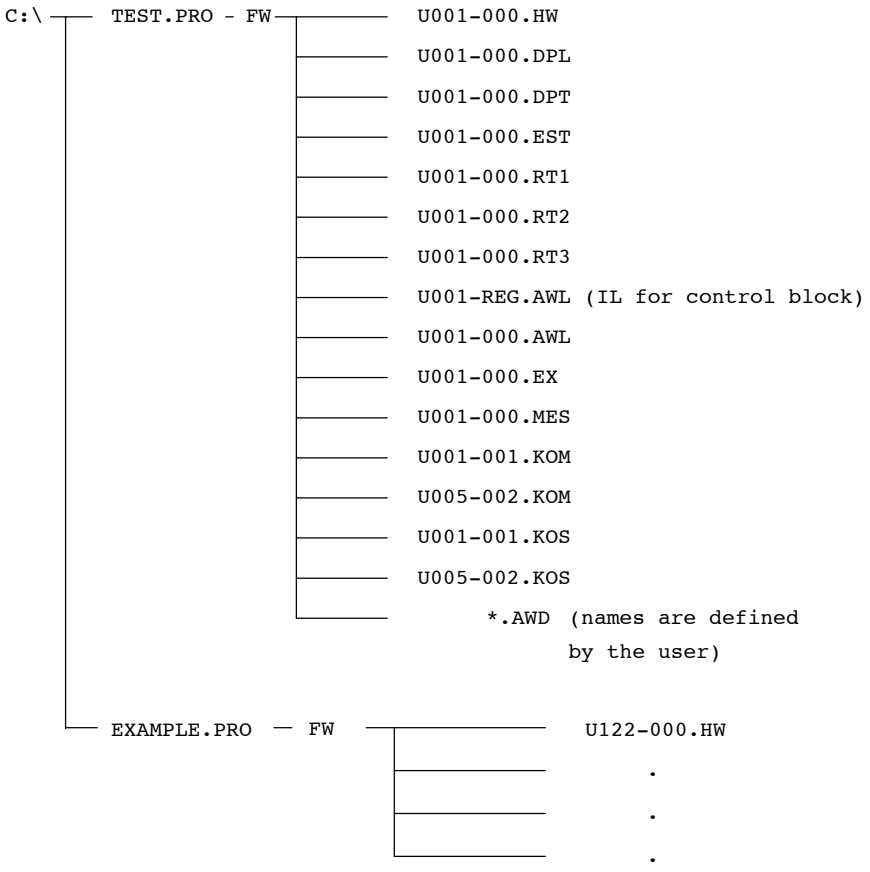
3.3 Directory Structure

The TOOL directory PRO-U120 is set up in the main directory PRO-FWT during installation. The individual programs (EXE files) and the system information for PRO-U120 are stored there. The subdirectories MACRO and TEXTE are also set up. These contain the macros for the IL generation or the files with the menu and help texts, the library and the firmware file.

The files set up by PRO-U120 are stored as follows:



Explanations about Uxxx-yyy.HW etc.

xxx Master station no. (000-126)
yyy Line number (001-999)
The number 000 is used for files which contain the data for the whole master station and which are not assigned to a certain line.

The names of the system directory and the outstation numbers are entered in the configuration data menu (see chapter 5.2.1). The line numbers are entered in the ZOOM function.

Chapter 4
Configuration

4.1 Definitions of the Communication Ports

The outstastion is linked to the master station with the KOS 201. It is the link between the ALU 200/201 and the serial bus SEAB-1F.

The KOS 201 is treated like an I/O module. 128 bytes are provided in each direction for communications with the ALU 200.

Output byte:

QB x.1 ... QB x.128 transports data from the ALU 200/201 to the KOS 201 (monitoring direction).

Input byte:

IB x.1 ... IB x.128 transports data from the KOS 201 to the ALU 200/201 (control direction).

x is the KOS slot reference

☞ **Note** Since the SEAB-1F has a 16-bit structure, 2 bytes are always combined for one data type. In the following text the term “word” will therefore always be used.

The 1st word in the monitoring direction is reserved for system information. This means that only 63 words are available for the data transmission.

The clock time can be transmitted with the corresponding parameter assignment of the KOS 201 using the last 4 words in the control direction. In this case only 60 words are available for the data transmission.

4.2 Definition of the Data Types

4.2.1 Monitored Information

Configurable at DEO 216, DEP 208, DEP 216, DEP 296, DEP 297, DAP 212, DAP 220, DAP 292

Allocation In groups of 8 inputs each

Processing No special processing. Two input groups are allocated to one word and passed to the KOS 201.

Note Transient information must be assigned parameters as real-time information. If no DCF receiver is connected to the KOS and no time telegram is sent by the master station, the real-time information is transmitted with the fine time FFFFH and without course time telegrams.

4.2.2 Double-point Information

Configurable at DEO 216, DEP 208, DEP 216, DEP 296, DEP 297, DAP 212, DAP 220, DAP 292

Allocation In groups of 8 inputs each

Processing The inputs 1 and 2, 3 and 4, 5 and 6, 7 and 8 of an input group are checked for a malposition. If there is a malposition (same state at both inputs), the transfer to the KOS 201 is suppressed for a certain length of time. This time can be parametered per outstation. (see also Chap. 5.2.2)

☞ **Note** Inputs which are not used should be assigned alternately 0 V and 24 V, as otherwise malpositions are constantly recognized.

4.2.3 Return Information

Configurable at DEO 216, DEP 208, DEP 216, DEP 296, DEP 297, DAP 212, DAP 220, DAP 292

Allocation In groups of 8 inputs each
The first parametered return information, counted starting with slot 1, is allocated to the 1st cancelled command, etc. For reasons of clarity, input and output modules with return information and cancelled commands should be inserted next to each other, but this is not absolutely necessary (see Chap. 4.2.13, Figure 3).

☞ **Note** The assignment is made by entering <R> and data type selection “single-point information” or “double-point information”. (DEP 208, DEP 216, DEP 296, DEP 297)
For a DAP 212, DAP220 or DAP 292 the inputs are automatically interpreted as return information if the outputs are parametered as cancelled commands. Of course these inputs may not be assigned parameters as counter measurands in this case. The inputs of a DAP 212, DAP220 or DAP 292 cannot be used as return information for other output groups.

Processing Return information is treated as single-point informations or double-point information, depending on the parameter assignment. A 1 at the input cancels the assigned command.

4.2.4 Real-Time Information

Configurable at DEO 216, DEP 208, DEP 216, DEP 296, DEP 297, DAP 212, DAP 220, DAP 292

Allocation In groups of 8 inputs each

Processing The real-time information is transmitted to the KOS 201 like normal information. It is stamped there with the time and stored in the ring buffer.

4.2.5 System Information

Configurable at Cannot be configured, virtual information.

Allocation Is always assigned to the 1st word in the monitor direction and has the subaddress (A1-byte) 0.

Processing The system information contains the following information:
Module disturbed (1-18 binary coded) bit 2^0 to 2^4.
More than one module failed bit 2^5 = 1.
No return information for last actively cancelled command bit 2^6 = 1.

Note You can also transmit the faulty or disturbed modules n of 18 coded to two further system information telegrams. This system information has the subaddress 1 (slots 1 to 16) and subaddress 2 (slots 17 and 18). This information is configured in the menu “General Outstation Data”.

4.2.6 Counted Measurands

Configurable at DEO 216, DEP 208, DEP 216, DEP 296, DEP 297, DAP 212, DAP 220, DAP 292

Allocation In groups of 8 inputs each. The number of inputs actually required is also specified.

Processing The counter measurands are formed in the IL. Counter pulses of 20 Hz are possible, but depend on the IL scan time. First there is a check of the edge. The allocated marker word is incremented for each rising edge of the pulse input. It is reset to 0 when the value 65535 (FFFFH) is reached.

Caution For counted measurand processing, the ALU201 must be used with a backup battery so that the counter states are not deleted if there is a power failure.

4.2.7 Measurand 8 Bits without Sign

Configurable at ADU 204, ADU 205, ADU 206

Allocation Depending on module. The number of actually required inputs is also specified.

Processing The measurands are formatted left-justified in a function block. Only positive measurands are transmitted. Negative measurands are set to 0.

Note If the ADU 206 is used, a measuring range of 1V or 10V can be set for each of the 4 measurand inputs. The ADU 206 already provides left-justified measurands. Therefore there need only be a limitation to $\pm$32000.

4.2.8 Measurand 11 Bits with Sign

Configurable at ADU 204, ADU 205, ADU 206

Allocation Depending on module. The number of actually required inputs is also specified.

Processing The measurand is formatted left-justified in a function block and limited to ±32000. This corresponds to a scale end value of ± 2000.

☞ **Note** If the ADU 206 is used, a measuring range of 1V or 10V can be set for each of the 4 measurand inputs. The ADU 206 already provides left-justified measurands. Therefore there need only be a limitation to ±32000.

4.2.9 1-Pole Commands

Configurable at DAO 216, DAP 204, DAP 208, DAP 216
DAP 212, DAP 220, DAP 292

Allocation Depending on outstation

Processing A command from the master station controls an output.

4.2.10 2-Pole Commands

Configurable at DAO216, DAP204, DAP208, DAP 212, DAP216, DAP220, DAP292

Allocation Depending on substation

Processing **DAO 216, DAP 216** A command from the master station controls 2 outputs of a DAO 216 or DAP 216. Output 1 and 9, 2 and 10, 3 and 11 etc. form a 2-pole command.

Caution **The 2-pole output is only possible by connecting an interface relay between the end relay and the output module.**

Processing **DAP 204, DAP 212** A command from the master station controls 2 outputs. Output 1 and 2, 3 and 4 each are one 2 pole command.

Processing **DAP 208** A command from the master station controls 2 outputs. Outputs 1 and 2, 3 and 4, 5 and 6, 7 and 8 each are one 2-pole command.

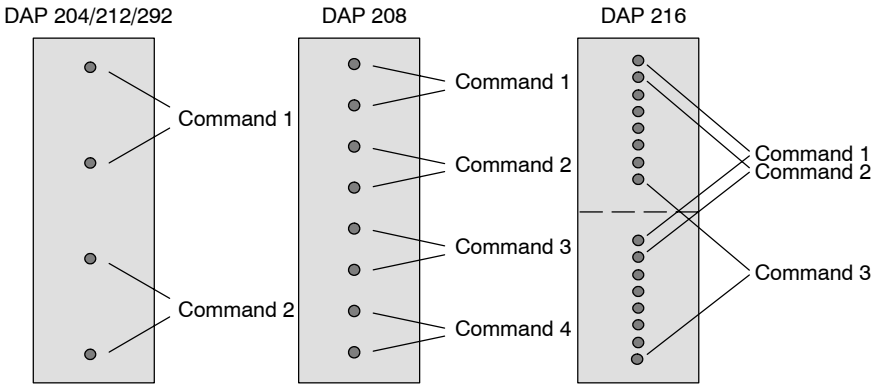


Figure 2 2-pole command output on DAP 204, 212 and 216

☞ **Note** A 1 of n check is made before each command output. No further command can be output as long as one command is running. Commands which arrive during the command runtime are lost.

Three possibilities exist for processing the above-mentioned command types:

- Pulse commands (commands whose output time can be parametrized)
- Persistent commands
- Actively cancelled commands

The type of processing can be assigned to an output group of 8 outputs (DAO 216, DAP 216) or by module (DAP 204, DAP 208, DAP 212, DAP 292).

4.2.11 Pulse Commands

The output time can be assigned parameters depending on the output group. A timer with the parametrized output time is set and started as soon as a command is output. The command output is reset when the timer has expired.

4.2.12 Persistent Commands

One time for spanning the telegram runtimes is parametrized for each outstation. A timer with the parametrized time is set and started as soon as a command is output. The command output is reset when the timer has expired.

In contrast to the pulse commands, the timer is repeatedly reset and restarted by sending the **same** command.

4.2.13 Actively Cancelled Command

A cancel supervise time and a cancel link time is parametrized for each outstation.

A command is output until the assigned return information arrives or the cancel supervise time has expired. The command is not immediately reset after arrival of the return information, but only after expiration of the cancel link time.

If a command was not cancelled by its return information, but was reset after expiration of the supervise time, bit 2^6 in the organization information word is set.

☞ **Note** Actively cancelled commands cannot be configured for the DAP 204.

The return information is assigned as described in Chap. 4.2.3.

There is 1:1 assignment for 1-pole commands.

8 information inputs of a DEP 208 or DEP 216 are used as return information for 2-pole commands on DAO 216 or DAP 216.

The first two pieces of monitored information from the same module are used as return information for 2-pole commands on DAP 212 or DAP 292.

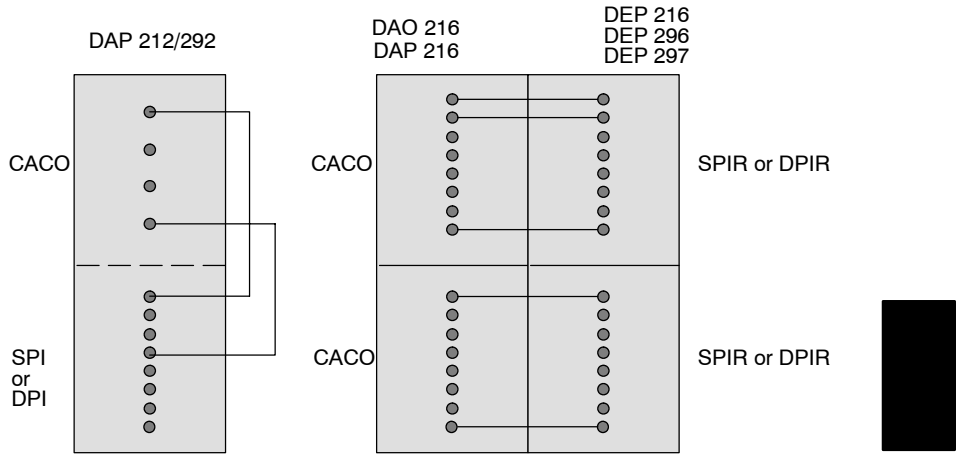


Figure 3 Assignment of Cancelled Commands and Return Information

4.2.14 Digital Setpoint Values

Configurable at DAP 216, DAO 216

Allocation Depending on module

Processing No special processing. The 16-bit value is output on 16 outputs.

4.2.15 Analog Setpoint Values

Configurable at DAU 202, DAU 208

Allocation The number of setpoint values is configured.

Processing No special processing.

Note Make sure that the valid range of ±32000 is not violated by the master station.

4.3 Configuration Limits

Table 1 Configuration Limits

Data type	Number	Structure
Monitored information	256	Bit
Real-time information	256	Bit
Counter measurands	63	Word
Measurand 8 Bit	64	Byte
Measurand 11 Bit	63	Word
Organization information	48	Bit
1-pole/2-pole commands	256/128	Bit
Digital setpoint values	16	Word
Analog setpoint values	32	Word

The specified numbers are single limits. The total limits result from the sytem limits such as the capacity of the communications port (EB/AB each 128 bytes) and the equipment conditions.

4.4 Special Features

- The KOS 201 can only be used in the central subrack.
- Clock antenna DCF77E can only be used for KOS 201.
- Gaps can occur in the module addressing if a bus extension cable is used.
- Only DTA 201 can be used as a secondary backplane if a bus extension cable is used.
- Use for measurand processing ALU 201 or backup battery control gear.
- PRO-U120 does not support the measuring range spread set with a control byte and the setting of unipolar measurands possible with the ADU 206.
- The name KOS 201 refers to the mode resp. ident code of the KOS.

  KOS 201 = ID-Code 90 → 128 I/O-bytes

  However, you can also use the KOS 202 as hardware.
- With the FWM 007/008, you have to use the KOS 202 as hardware. (a variant with 8 kB ring buffer store)

Chapter 5
Handling

Configurating, parametering and programming with PRO → U120 is described in this chapter.

This chapter is a reference manual for the person configuring. Its structure corresponds to that of the menues.

5.1 General Information

The individual menu points are described in the order listed below.

- Data input — Chapter 5.2
- Data archive — Chapter 5.3
- IL generation and transfer — Chapter 5.4
- Printer output — Chapter 5.5
- Screen output of the bill of materials — Chapter 5.6

5.1.1 The Line Editor

The line editor is used for inputting project data, commenting the data point list and extending the library file.

Table 2 Keyboard Definition (US-Keyboard)

Key	Definition
← (Backspace)	Delete character to the left
<Del>	Delete character above cursor
<Ins>	Insert/overwrite switch (is displayed to the right in the last screen line)
<Home>	Cursor to first character of input line
<End>	Cursor to last character of input line
< ← >	Cursor one position to left
< → >	Cursor one position to right
< ↑ >	Cursor to start of previous input line
< ↓ >	Cursor to start of next input line
<Cr>	Terminate input
Only for data point list, library and bill of materials	
<PgUp>	Previous page
<PgDn>	Next page
Only for data point list	
<Alt>+<M>	Mark a line to copy
<Alt>+<A>	Mark line block, start
<Alt>+<E>	Mark line block, end
<Alt>+<C>	Copy marked line or line block to current cursor position.

Since many computers are equipped with a US keyboard, the special German letters were assigned to function keys.

<Shift>+<F1> = Ä
<Shift>+<F2> = Ö
<Shift>+<F3> = Ü
<Shift>+<F4> = ä
<Shift>+<F5> = ö
<Shift>+<F6> = ü
<Shift>+<F7> = ß
<Shift>+<F8> = |
<Shift>+<F9> = ≤
<Shift>+<F10> = ≥

Additional columns can be set up in the comments part of the data point list with <Shift>+<F8>.

☞ **Note** The complete set of characters can be edited with <Alt>+<ASCII-keyboard code>. The number sequence may only be entered using the numeric block.
The corresponding tables can be found in the PUTE user manual or in the printer manual.

Example:
The letter Ä should be input with the keyboard code. Press the Alt key and then the digits 1, 4 and 2 one after the other. Release the Alt key and the Ä appears on the screen.

5.1.2 Start of PRO → U120 E0 B1

PRO → U120 is started from the main menu PRO → FWT. A header which defines the current version of the operating software appears once after the call. The main menu PRO-U120 appears after any key is pressed and you can begin configuration.

PRO → U120 loads the last processed system and station into user memory after the call.

Caution The system “NONAME” and the station “U000-000” are set by the installation routine during the first start.

- If the loaded station is to be processsed, one must decide whether the data model should be regenerated or only **supplemented**. The data model should always be regenerated as long as it is not passed to a master station.

Caution If the data model of an outstation has already been accepted in a master station, please only continue processing with “supplement” as otherwise the data model of the master station also must be changed.

Warning Supplementing means that the data points are included. Data points which already exist may not be modified or deleted as this results in chaos in the data model. Deletion or modification is only possible in “restart” mode.

5.1.3 Autosave

Before leaving certain submenues, the data edited or generated there are stored on hard disk. In particular these are the menues:

- Data input
- Number of data points
- Module select
- Measurand processing
- Control blocks
- Data point list
- Edit Library
- Generate IL
- Display of the bill of materials on the screen

5.2 Data Input E1 B1

☞ **Note** Modification of the module or data point assignments is only possible in **restart** mode. The same is valid for deleting modules or data points.
Empty slots can be assigned modules in the **supplement** mode. Similarly, inputs or outputs can be defined on already existing modules for which no data was previously assigned. These new entries can be modified and deleted within a supplementary run. If the station is processed again in “supplement” mode, these data also have write protection.

5.2.1 Project data E2 B1

”Data input”,”Project data”
(F1→F1)

The last date of station processing is displayed. The user cannot change this line.

System **E3 B1**
An input of at most 8 characters is **required**. The system name is at the same time the name of the subindex in which the data of the outstation are archived (see Chap. 3.3). For this reason only characters which are permitted as index names under DOS may be input.

Outstation, Comments, Operator
A maximum of 16 characters may be input. All characters which can be displayed may be used (see Chap. 5.1.1).

The specifications define more exactly an outstation. They are printed in the documentaiton in the form of a header.

Outstation number
It is also called the outstation address or A-Byte for the SEAB-1F. An outstation number between 0 and 126 **must** be entered. It is also used to identify the individual files during archiving (see Chap. 3.3).

☞ **Note** You can copy the station set by overwriting the system name or the outstation number. First, however, it must be stored with the “data archive” menu.

Example:
System “EXAMPLE” and outstation-No. “0” are loaded and should be copied to “EXMAPLE\U005-000”.

Step 1 Overwrite UST-No. “0” with a “5”.

Step 2 Leave menu with <F9> or <Esc>.

Step 3 Interrogate if outstation should be copied. Answer with <J> <Cr>.

Step 4 Outstation is copied.

If you answer step 3 with <N> <Cr>, the system “EXAMPLE” outstation-No. “0” is not copied but “EXAMPLE\U005-000” is opened as the new station.

☞ **Note** If the station “EXAMPLE\OST5” already exists, the corresponding message appears on the screen. You can now decide whether the archived data should be overwritten or loaded into user memory.

In the same way you can copy “EXAMPLE\U000-000” to “TEST\U003-000” by overwriting the system names and the outstation number.

You can then modify and supplement the corresponding menues.

5.2.2 General Outstation Data E2 B1

”Data input”,”General outstation data”
(F1→F2)

The values set in this menu are valid for the **entire** outstation.

IL in Monitoring Direction
The information is transmitted in monitoring direction to both KOS modules in each IL scan. The 128 output bytes of the 1st KOS are copied in a program block to the 128 output bytes of the 2nd KOS. Bytes which are not used a re also copied.

IL in Control Direction
To prevent setpoint values from two master stations from colliding with each other, a control command defines whether the data of the 1st or 2nd KOS are to be processed in the IL. This command message is transmitted in input bytes 1 and 2 to the IL and must set the 1st bit in the IB x.1. The IL checks these bytes in each scan. The commands and setpoint values of the last master station to send this control command are output.

After a cold restart, the 1st KOS (left) is taken as default KOS until a corresponding control instruction is set by one of the master stations.

PRO-U120 offers the next free group as command group. The first command of this group is the control command. The group number, however, can be changed in the KOS parametrization in the “Data for Control Direction” menu.

The command is computed from: (group number * 16) + 1

Example:

IB 2.1	BE	02	(control comand byte)
IB 2.3	BE	00	(single commands)
IB 2.5	BE	01	(single commands)

Command 33 is the control command in this example.

Caution Make sure that a master station may only send a control command when it is ensured that all the setpoints in the particular KOS have the current state.

Command type **E3 B2**

One can choose 1-pole or 2-pole command output by toggling.

For **1-pole** command output, a command from the master station controls one output of an output module.

For **2-pole** command output, a command from the master station controls one output each of the upper and lower output groups for the DAP 216. Outputs 1 and 9, 2 and 10, 3 and 11 etc. thus each form a 2-pole command. For the DAP 204 and DAP 212, the outputs 1 and 2 as well as 3 and 4 each form a 2-pole command.

Cancel link time **E3 B2**

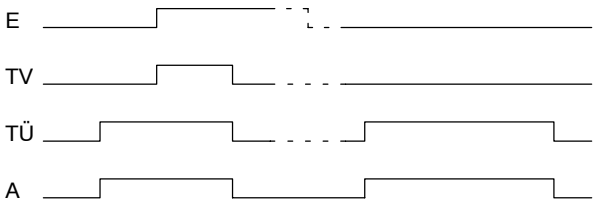
Setting range: 100 msec to 99.9 sec
Standard setting: 200 msec

The arrival of the return information starts the timer for the cancel link time. The command output to be cancelled is reset after expiration of this timer.

Cancel supervise time **E3 B2**

Setting range: 100 msec to 99,9 sec
Standard setting: 30 sec

As soon as a command with active cancellation is output, the timer for the cancel supervise time is also started. If the return information does not arrive, the command output is reset after expiration of this timer. If this case occurs, bit 2^6 in the organization information word is set.



E = Input of return information
TV = Cancel link time
TÜ = Cancel supervice time
A = Command output

Figure 4 Time diagram for actively cancelled commands

Malposition suppression time **E3 B2**

Setting range: 100 msec to 99,9 sec
Standard setting: 20 sec

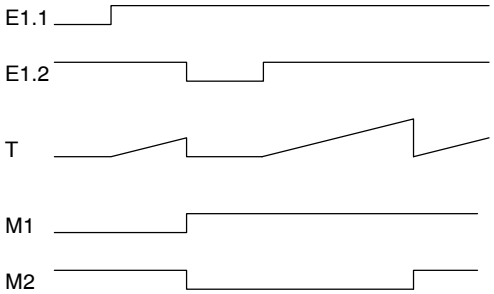
The transmission of the malposition is suppressed for this time span for double-point information. If both monitoring information inputs have the same state, the timer for the malposition supervision time is started.

If a further malposition occurs during the timer execution time, the timer is reset and started again immediately. After expiration of the timer, the malposition is transmitted to KOS 201.

If the malposition is corrected, i.e. the monitoring information input changes its state, the timer is reset. The information change is immediately transmitted to KOS 201.

If several malpositions occur at the same time, the timer can only be reset by correcting the last malposition.

Caution Double-point information inputs which are not used should be assigned alternately the levels 0 and 1 as otherwise they are interpreted in the IL as malpositions and constantly start the timer for the supervise time.



E1 und E2 = Double-point information inputs
T = Malposition suppression time
M1 und M2 = Information status which is tranferred to master station

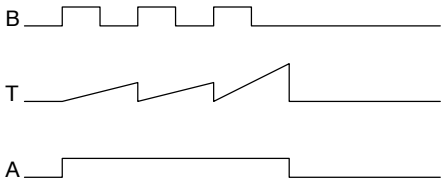
Figure 5 Time diagram for malposition suppression

Delay time for persistent commands **E3 B2**

Setting range: 100 msec to 99,9 sec
Standard setting: 2 sec

This delay time spans the telegram operating times between the outstation and the master station.

If a consistent command is sent by the master station, the timer for the delay time is started. If the same command arrives again during the timer operating time, the timer is reset and started again immediately. The command output is only reset when the timer has expired.



B = Command from master station
T = Delay time
A = Command output

Figure 6 Delay time for persistent commands

Reserved Words in Monitoring and Control Direction: **E3 B2**

You can reserve “transport capacity” for virtual data or for process data which you keep in a separate part of the IL. The number of words to be reserved can be specified but not their position on the ALU-KOS-interface. The reservation is made in monitoring direction **after** the first word required for the status transport or after the third word if “module failure information n of 18” was configured. Reservation **starts** with the first word in control direction. The area thus defined is not used by PRO-U120 during generation of the IL.

The EB/AB area of KOS which is reserved is auatomatically displayed when your input is terminated with <Cr>.

☞ **Note** The reserved area of EB/AB can be defined “manually” with the KOS parameters.

Module failure information

Failed terminals are reported in the organization information with the subaddress 0. If several terminals fail, only the one with the highest slot address is reported. Since is some cases this is not sufficient, you can set here that the failed I/O terminals should be reported coded n of 18. 2 organization information telegrams with subaddress 1 (slots 1 - 16) and subaddress 2 (slots 17 and 18) are generated for this purpose. The setting is made by toggling.

1st	Module location	→	Subaddress 1, D2.0 ABx.3, Bit 2^0
2nd	Module location	→	Subaddress 1, D2.1 ABx.3, Bit 2^1
	.		
	.		
	.		
18th	Module location	→	Subaddress 2, D2.1 ABx.5, Bit 2^1

x = Slot reference KOS

DCF-Receiver

You can specify whether or not the KOS 201 should be equipped with a DCF-receiver. The setting is made by toggling.

5.2.3 Number of data points E2 B1

This menu contains the call for two more submenues. E3 B2

- Presetting
- Data point input

PRO → U120 determines the required number of subracks and I/O modules using the input and preset data.

PRO → U120 makes an equipment suggestion which you can change in the menues “subrack select” and “module select”.

Note It is recommended that you take this sequence of suggestions into consideration in the initial system concept and then not change it.

”Data input”,”Number of data points”,”Presetting”
(F1→F3→F1)

☞ **Note** You can display Helptext about all interrogations in this menu by selecting the corresponding line or setting and calling the Helptext with <F10>.

Central processing unit
You can toggle the ALU types ALU 200 and ALU 201. If ALU 201 is set, the power supply DNP 205 is automatically taken into consideration in the slot assignment.

Output voltage
You can toggle between 24 V and 60 V peripheral voltage. If the peripheral voltage is 60 V, the commands are automatically output to the relay module DAP 212.

☞ **Note** The display for “Output via relay” cannot be changed if there is 60V peripheral voltage.

Additional Power Supply
If a 24 V input power supply is not available, you can include additional power supplies. PRO → U120 provides the following three modules:

DNP 220
DNP 260
BAC 224

The setting is made by toggling.

Output with relays
You can choose whether or not commands should be output via relays for a peripheral voltage of 24 V. If the peripheral voltage is 60 V, output is always via relays. The setting cannot be toggled in this case.

Measurands
You can set whether the measurands should be input isolated or non-isolated.

Data point input **E4B2**

”Data input”,”Number of data points”,”Data point input”
(F1→F3→F2)

Input: **E3 B3**
The input must be decimal and terminated with <Cr>. The following upper limits are monitored:

- Maximum number of I/O modules
- Capacity of ALU-KOS interface exceeded
- Maximum number of data points for this data type

If one of these limits is exceeded, the corresponding message is output on the screen and the input is not accepted.

The number of reserved slots is displayed at the lower end of the screen. Similarly, the free slots are displayed based on the maximum configuration of 18 slots.

Note The selection of I/O modules is limited for this function to:
ADU 205
ADU 206
DAU 202
DEP 216
DAP 216
DAP 212

Since information and commands only can be reserved in groups of 8 or 4, it is automatically rounded up when you leave the menu. Don't be surprised therefore if your definitions have been changed when you select this menu again.

When assigning the data points to the I/O modules PRO → U120 proceeds as follows:

1. Pulse commands
2. Single-point information
3. Double-point information
4. Real-time information
5. Measurands
6. Digital setpoint values
7. Analog setpoint values
8. Measurand 8 Bit
9. Measurand 11 Bit

Caution If you made changes or extensions with the menues "subrack select" or "module select", you should not select this function again. PRO → U120 overwrites your entries with its "suggestion".

5.2.4 Subrack select E2 B1

”Data input”,”Subrack select”
(F1→F4)

Selection: **E3 B4**
The selected subracks are displayed inversely. You can change the setting with
<↑> or <↓>

If an existing selection is “reduced”, any I/O modules are deleted.

You are informed if this is the case so that you can retract the change.

You can set whether or not a bus extension cable should be used with <→> or <←>.

Note If a bus extension cable and 2 or 3 subracksare used, the slot distribution is not continuous. Gaps occur in the addressing. The subracks are displayed appropriately in the menu “module select”.

When leaving the menu with <F9> or <Esc>, the selected subracks are included in the configuratino of the station.

5.2.5 Module and Subrack Assignment E2 B1

”Data input”,”Module and subrack assignment”
(F1→F5)

Selection: **E3 B5**

The subracks are displayed graphically according to the setting in the menu “subrack select” or with the preset values in the menu “number of data points”. Since not all the subracks have room on the screen next to each other, they are displayed in two rows, one below the other.

However, this does not mean that a bus extension cable must be used. If you configure a bus extension cable, it will be displayed as a connection between the upper and middle subrack.

The 3rd top hat rail should enable the user to configure additional power supplies or interface relays etc. No I/O modules may be entered there because the ALU can only address a maximum of 4 subracks with 18 I/O slots.

There is a window with the I/O modules, the communications processor module and the power supply on the left side of the screen.

The Helptext for the selected module to the left in the window can be called with <H>.

The individual modules are selected with < ↑ > and < ↓ >, the subrack slot is selected with < ← > and < → >. An arrow indicates the current position.

The set module is entered in the selected subrack slot with <Cr>.

A plausibility check whether this entry is valid is carried out. If this is not the case, a message is output and the entry is not made.

Furthermore, the power load of the 5 V and 24 V power supply is monitored. If for example the maximum of 700 mA, with which the 5 V power supply of the ALU 200 can be loaded, is exceeded, the appropriate message is output. In this case you can only use the ALU 201 together with the power supply DNP 205 (max. 2 A).

The module can be deleted from the marked slot with <Del>.

☞ **Note** If you are working in “supplement” mode, modules which were assigned data points during previous processing are not deleted or overwritten.

The module which is set in the subrack can be marked for copying with <Alt>+<M>. This is displayed with a * at the lower edge of the module.

A marked module including the data point assignment can be copied to the set subrack slot with <Alt>+<C>.

Survey

”Data input”,”Module and subrack assignment”,”Survey”
(F1→F5→F8)

The number of configured data points as well as the assignment of the KOS-I/O area (unused words in monitoring and control directions) are displayed in a window. Similarly, unused digital and analog inputs and outputs are displayed.

If digital inputs of counter measurand data type were assigned to a group of 8 and a value less than 8 was specified as number, these unused digital inputs are marked specially as “unused counter measurand inputs”.

The computed load of the 5V and 24V power supply is displayed in a second window which appears when a key is pressed. Similarly, the maximum load of the 5V power supply defined by the ALU 200 or DNP 205 is displayed. If one of the provided mains DNP 220, DNP 260, BAC 224 was configured, the maximum load of the 24V power supply is also displayed.

☞ **Note** This summary can also be called from the ZOOM menu with <F8> or from the main menu with <ALT>+<U>.

ZOOM on/off **E4 B3**

”Data input”,”Module and subrack assignment”,”ZOOM on/off”
(F1→F5→F1)

Once the I/O modules have been allocated, they can be assigned data points. Zooming is possible here, i.e. an I/O module can be displayed enlarged. The I/O module marked to the right in the subrack is displayed to the left in the figure.

In order to display another module, the slot in the subrack must only be changed with <←> or <→>. You need not leave the “ZOOM” function.

The relevant I/O module is displayed graphically in the window which was opened by the ZOOM function. The valid data point types are listed to the right of it. (see Chap. 4.2)

These are:

- Single-point information
- Double-point information
- Real-time information
- Counter measurands
- Measurands 8 Bit
- Measurands 11 Bit
- Actively cancelled commands
- Persistent commands
- Pulse commands with command runtime
- Digital setpoint value output
- Analog setpoint value output

The individual modules are displayed subdivided into data groups.

Monitored information and counter measurands are assigned in groups of 8 inputs.

Commands are assigned by module or in groups of 8 outputs.

Analog and digital setpoint value output as well as measurands are assigned by module.

- DEP 208 subdivided into 1 x 8
- DEO 216 subdivided into 2 x 8
- DEP 208 subdivided into 1 x 8
- DEP 216 subdivided into 2 x 8
- DEP 296 subdivided into 2 x 8
- DEP 297 subdivided into 2 x 8
- DAO 216 subdivided into 2 x 8
- DAP 212 subdivided into 1 x 4 and 1 x 8
- DAP 292 subdivided into 1 x 4 and 1 x 8
- DAP 216 subdivided into 2 x 8
- DAP 220 subdivided into 1 x 8 and 1 x 8
- ADU 204 subdivided into 1 x 4
- ADU 205 subdivided into 1 x 4
- ADU 206 subdivided into 1 x 4
- DAU 202 subdivided into 1 x 2
- DAU 208 subdivided into 1 x 8

The individual connect groups are selected with <Home> and <End>.
The data types are set with < ↑ > and < ↓ >.
The selected data type is passed to the connect group with <Cr>.

An assigned data type can be deleted with <Del>.

☞ **Note** When working in “supplement” mode, data points which were configured during previous processing cannot be deleted or overwritten.

For pulse commands, a command runtime (command duration) can be assigned per output group. Times between 100 msec and 99,9 sec are possible. The standard setting is 300 msec. The runtimes for persistent commands and actively cancelled commands are assigned in the menu “general outstation data” (see Chap. 5.2.2).

Connect groups with 8 or 4 inputs are always defined for counter measurands and measurands, but the number of inputs actually used must also be specified.

Analog setpoint value outputs are handled in the same manner.

The number or command runtime must always be input if the corresponding query is displayed inversely in the ZOOM window.

If an ADU 206 was selected for the measurand processing, a measuring range of 1V or 10V can be selected for each of the 4 measurand inputs. The selection window can be called with <*>.

You can identify single-point or double-point information as return information for actively cancelled commands by entering <R> before the <Cr>. The information group is entered in the window with ”ME R” or ”DMER”. The setting ”R” is maintained until the data type or module is changed.

Note Special function for linking to master stations Geadat VEN.
An 8-input monitored information group can be specially marked by entering < N > (N = new subaddress) so that it can be assigned to a specific new SEAB-telegram. This monitored information group is displayed in the window with ”SPIN”.
The setting ”N” is maintained until the data type or module is changed.

Caution When assigning counter measurands, measurands and analog setpoint value outputs, one should make sure that there are no gaps in the assignment.

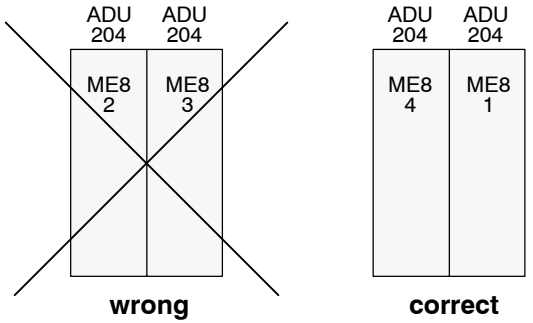


Figure 7 Data point assignment

You can process unused counter measurand inputs, measurand inputs and analog outputs in a separate IL part if necessary.

This is not valid for monitored information inputs and command outputs because these are always processed by the “generated IL”. If these inputs and outputs are processed with one’s own IL nevertheless, one must make sure that there is no collision with the generated IL. The generated IL must be changed if necessary.

Warning An IL generated with PRO → U120 is supplemented with user-dependent PLC functions according to the Dolog AKF → A120 rules.
If the blocks generated by PRO → U120 are changed, no guaraantee can be made that these changed blocks will function correctly.

The following upper limits are checked after each data point assignment:

- maximum number of data points per data type
- capacity of the ALU-KOS-interface
- power load of the 24 V and 5 V power supply

A message appears on the screen if an upper limit is exceeded and the assignment is not made.

You can call a survey of the assigned data points with the function key <F8> (see Chap. 5.2.5).

Peculiarities when zooming the KOS:
The module KOS 201 has a special status. No data points are assigned here in the ZOOM function; instead the parameter assignment program is called and the line numbers and possibly an additional module are entered. The input of a line number is necessary for the bottom-up configuration in order to make a connection between the outstation and the master station or subst ation. The line number also defines the file names for storing the KOS parameters.

The descriptions of these parameter assignment programs can be found in Part IV.

The call becomes active with <Cr>. The line number is entered in decimal between 1 and 999. The additional module is set by toggling. If you do not want to call the parameter assignment program, move the cursor in the subrack on by one slot. However, this is only possible if the cursor points to the uppermost line.

The KOS parameter assignment program can also be called from the main menu with <Alt> + <K>. If several KOS modules were equipped, the KOS parameter assignment is called with the lowest slot reference.

Before the KOS main menu appears, there is a query whether the KOS parameters should be newly defined or whether they should keep the old data. If the KOS file is newly defined, the standard settings are made for the transfer bit, ring buffer entry, edge detection, etc.
If you made not changes to the data points, you can call the KOS parameter assignment without generating a new file. Your settings made in a previous call are not changed.

Several KOS modules in one outstation

Maximum number of KOS modules:
3 KOS for central processing unit ALU 200
2 KOS for central processing unit ALU 201

If more than one KOS is configured in an outstation, the KOS with the lowest slot reference is used for the generation of the IL. However, the same parameter as the “IL-KOS” is passed to the other KOS modules.

The parameter assignment for the 2nd or 3rd KOS can **only** be called by selecting and zooming the corresponding module in the “module and subrack assignment” menu. The outstation number entered in the “project data” menu is passed to all KOS with the first call of the parameter assignment program. You can change this as well as the other parameters as you wish. It is also possible to supplement or delete data type assignments in the “Data for monitored direction” or “Data for control direction” menues.

Note You must impelement the processing of the 2nd or 3rd KOS in a separate IL part.

Special remark for equipping command output modules:

2 types of modules are provided for command output: relay modules with 4 outputs each and semiconductor modules with 2 x 8 outputs each.

If it should be necessary to drive a combination of 4-output and 8-output modules in one station, they should be sorted before entering in the subrack.

In order to avoid gaps in the commands, the relay modules should be entered following the semiconductor modules.

The 4 outputs are combined when the input bytes of the KOS are assigned and thus in the data model, but an 8-output module is not “taken apart” and stored in different input bytes.

For reasons of clarity it is recommended that cancelled command output on semiconductor modules and the associated return information modules be adjacently equipped.

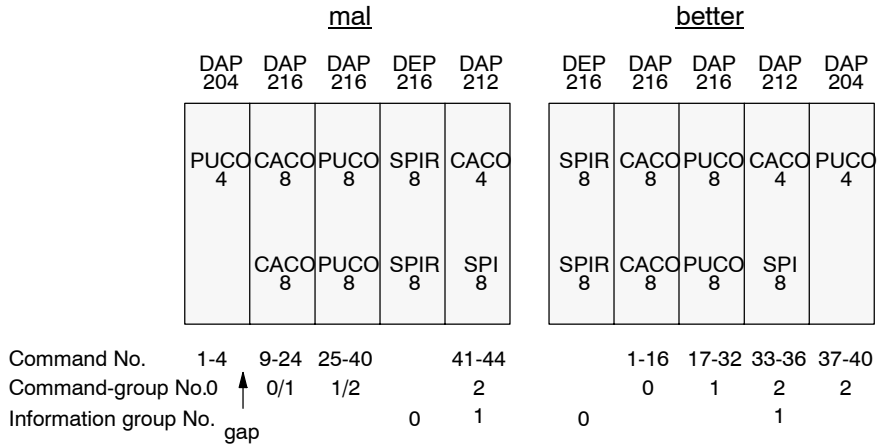


Figure 8 Equipment suggestion for command output modules

5.2.6 Special Processing of Data Points E3 B6

Measurand processing E4 B4

”Data input”,”Special processing of data points”,”Measurand processing”
(F1→F6→F1)

All the measurands configured in the “module select” menu are listed. Each single one can be assigned an upper and a lower limit to be monitored and a hysterese.

Limits from -32000 to +32000 for 11-bit measurands and from 0 to +250 for 8-bit measurands are possible. The hysterese is defined as an absolute value between 0 and 32000/250 and is valid for the upper and lower limits.

Two items of virtual monitored information are assigned to each measurand to be monitored during generation of the IL. One each is assigned for the upper and lower limit, even if only one limit is to be monitored. The virtual monitored information is assigned to the measurands in the order in which it occurs.

If the “supplement” mode of processsing is selected, limits which are entered later do not change the original order of the monitored information. The new monitored information is appended. The virtual monitored information for the limit monitoring begin with SEAB subaddress 32 (20H).

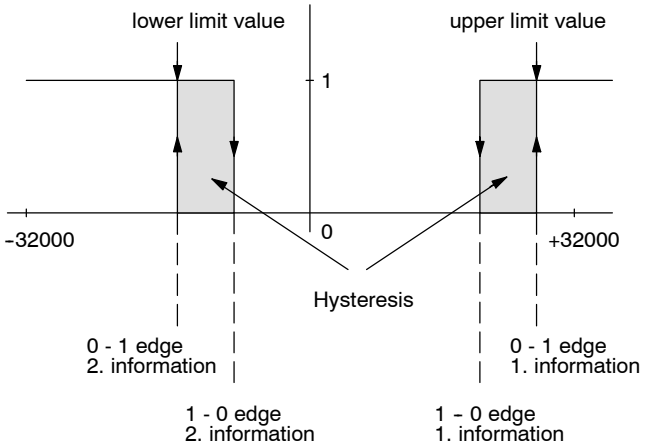


Figure 9 Limit monitoring of measurands

Input of the limits:
The current input field is displayed inversely. One reaches the next or previous input field (with stacked drop layout) with <Tab> and <Shift> + <Tab>.

One reaches the next or previous input field of a line with <Ctrl> + <→> and <Ctrl> + <←>.

Otherwise the requirements of the line editor are valid.

A message appears on the screen if a value less than -32000 / 0 or greater than +32000 / 250 is input and the value must be corrected.

Analog Extreme Values E4 B5

"Data Input", "Special Processing of Data Points", "Analog Extreme Values"
(F1 → F6 → F2)

All the configured 11-bit measurands are listed in this submenu. The software address with which a measurand is addressed under Dolog AKF is specified. This does not correspond to the hardware address. The definition 03.01

specifies the 1st measurand of an ADU at slot 3. 4 hardware connections of Pin 3...6 are assigned to this measurand.

You define the measurand for which extreme values should be determined by toggling with <Cr>.

There is also a query whether a maximum or minimum extreme value is required. It is also possible to determine both extreme values. This means, however, that both extreme values are determined and transmitted to the KOS for all the selected measurands.

One time interval which is also interrogated in this menu is valid for all extreme values.

Time interval:
Minutes 1,2,3,4,5,6,10,12,15,20,30
Hours 1,2,3,4,6,8,12,24

Extreme values are transmitted like “normal” measurands in the SEAB-1F. Identification is thus with the A1 byte. To prevent overlapping in extensions, the extreme values are sorted in decreasing order starting with A1 = 63.

The extreme values are displayed with “MWE” in the menu “Data Monitoring Direction” of the KOS parameter assignment.

Processing

The measurand the the relevant extreme values are compared in the IL in each scan. If the measurand is greater than the upper or smaller than the lower extreme value, it is transmitted to the KOS as the new extreme value.

Caution If analog extreme values are to be determined, the clock time must be transmitted to the KOS.

The clock time passed to the KOS by DCF signal or time message is transmitted in the EB area of the KOS. This time is used by the IL to standardize the temporary extreme value storage synchronously with the KOS.

Two-position controller **E4 B5**

”Data input”,”Special processing of data points”, ”Two-position controller”
(F1→F6→F2)

If the difference between the setpoint value (WE) and the actual value (XE) exceeds half the hysteresis value (HYS), the output (YA) is set depending on the sign of the deviation. The controller can be released with the release enable (EF = 1) and is reset with the reset enable (ER = 1).

You can set the time intervals in which the controller module should be executed using the clock pulse time (TA). If the controller is to be executed in each IL scan, enter the constant 0.

Clock pulse time (TA) = Constant * 100 ms

Three-position controller **E4 B6**

”Data input”,”Special processing of data points”, ”Three-position controller”
(F1→F6→F3)

If the difference between the setpoint value (WE) and the actual value (XE) exceeds half the hysterese value (HYS), the output (YP or YN) is set depending on the sign of the control deviation. A neutral zone (UZ) can be entered as well. The output is reset when the value is less than the corresponding inner edge. Overlapping of the hysteresis up to HYS = 2*UZ is possible.

The controller is released with the release enable (EF = 1) and reset with the reset enable (ER = 1). You can set the time intervals in which the control block is to be executed with the clock pulse time (TA). If the controller is to be executed in each IL scan, enter the constant 0.

Clock pulse time (TA) = Constant * 100 ms

”Data input”,”Special processing of the data points”, ”Pulse width modulator”
(F1→F6→F4)

The pulse width modulator converts a numeric control deviation (/WE - XE/) amplified by a factor (KR) into a proportional control time which is repeated regularaly in a fixed time pattern (TTK).

The effective output size resulting from the average value of the sampling rate can be used for example to approach a relatively inert path.

The pulse length is directly proportional to the control difference (Xd), the sampling rate and thus the proportionality of the PBR depends on the set pulse time. The controller can therefore be described as follows:

$$y\_eff = \frac{TTK}{Xd \times KR \times dt} \times 100\% \quad (0 <= y\_eff <= 100\%)$$

TTK is directly specified in seconds, dt results automatically with the 100 msec for all controllers.

The output of the YP/YN-pulses can be influenced with TMIN and TMAX. If the controller reaction time computed by PBM is less than the value of TMIN, no further pulse is output until larger pulse lengths are again computed.

If the computed controller reaction time exceeds the value TMAX, the controller reaction time is limited to this value.

These first steps prevent actuating pulses which are too short (e.g. for a valve), the last steps prevent continuous control.

Valid input and output parameters for all controller types:

15 controllers can be configured per controller type

Marker bit from M 8.1 to M 50.32

Marker words from MW 30 to MW 300

Constants from 0 to 32767

Inputs and outputs if the corresponding modules were entered in the subrack

Editing the controller
Home/End : toggle input and output parameters
Pg Up : call previous controller
Pg Dn : call next controller

Otherwise the requirements of the line editor are valid.

☞ **Note** Further information about the controllers can be found in the software package ”Loop CRTL → A120 → AKF” Ordering code 424 271 575.

5.2.7 Comment Data Point List E3 B7

”Data input”,”Comment data point list”
(F1→F7)

The data point list consists of the columns:

1. A-Byte (Outstation number)
2. F-Byte (Function byte)
3. A1-Byte (Subaddress)
4. D1/D2-Byte (Data bytes)
5. Address of the ALU-KOS-interface
6. Data type
7. Module connection
8. Comments

Columns 6 and 7 are defined by the configuration of the modules and the data point assignment. The remaining columns except for the comments are computed from these two definitions.

A maximum of 58 characters can be edited as a comment. This could be for example PV numbers or wiring remarks.

Columns 1-5 on the screen are not displayed for space reasons. The complete data points list can be output with the printer menu.

The requirements of the line editor are valid for editing.

It is possible to copy single lines or complete line blocks.

- You can mark the line containing the cursor for copying with <Alt> + <M>. The line is displayed blue or inverse.

- A line block is marked as follows:
  Cursor to 1st line to be copied and <Alt> + <A>. Cursor to last line to be copied and <Alt> + <E>. The block is displayed blue or inverse.

- The marked line or line block is copied starting with the current cursor position with <Alt> + <C>. The previous line contents are overwritten.

A line or line block can be copied with <Alt> + <C> until a new block or new line is marked.

A mark can be deleted by placing the cursor in front of the block and pressing <Alt> + <E>.

☞ **Note** Line blocks can only be marked and only copied within an I/O module, i.e. the target module need not be identical with the module in which the block was marked, but it cannot be copied past the last port of the target module.

Correct:
Copy port 1.1 to 1.4 to port 1.16
Copy port 1.1 to 1.22 to port 2.1

Incorrect:
Copy port 1.1 to 1.16 to port 1.18
Copy module 1 complete to port 2.10

The copy is aborted as soon as the last port of an I/O module is reached during copying.

Defining Key Macros

The keys F1 to F8 can be assigned a text of up to 20 characters in the line editor with <Ctrl+function key>. After the call, an edit field for the macro text appears in the lowest line of the screen. The text is assigned to the particular function key with <Cr>. The macros can be redefined at any time with <Ctrl+function key>.

Calling Key Macros

The particular macro text is entered in the line editor starting with the current cursor position with F1 to F8. Any existing text is overwritten. If a macro text cannot be completely stored because the line reaches the end, it is truncated.

5.2.8 Edit Library E3 B8

”Data input”,”Edit library”
(F1→F8)

All existing library files are listed in alphabetical order in a window. The arrow marking the selected library can be shifted with < ↑ > and < ↓ >. The lines are scrolled at the start and end of the window if more library files exist than can be displayed in the window.

When installing PRO → U120, a library (PRO120.BIB) is provided which contains all the necessary hardware and software components for the U120. The individual components are listed together with their names and part numbers.

You can copy this file to another with <F1>. You will be requested to enter the file name of the new library, which may have a maximum length of 8 characters. PRO → U120 appends the extension .BIB and thus identifies the file as a library file.

Caution Even if you created a new library with the copy funciton, you are still in the library which you selected when entering this menu. If you want to process the new library, leave the menu with <F9> or <Esc> and select it again with <F8>. The new library is then displayed for selection in the window.

You can delete all libraries except the one you read in to process with <F2>. You will be queried as to the file name and the corresponding library will be deleted after termination of the input with <Cr>.

It is advisable to create several library files if PRO → U120 is also to be used as a calculation aid. You can then enter a price per unit for each component in the last column and create several files with different customer reductions.

It is also possible to store library files having a certain combination of components as standard files.

The individual libraries contain 120 positions, which are divided into 3 categories.

Positions 1 - 28 are the subracks and the modules whose number is defined by the configuration (see Chap. 5.2.2, 5.2.4 and 5.2.5). Only the price per unit can be edited here in the last column.

Positions 29 - 113 are hardware and software components for which you can define whether and how often they should be included in the bill of materials. This is done by entering the required number in the first column.

Positions 114 - 120 are at your free disposition. You can enter for example special modules or the costs for installation and configuration. The costs per item entered here are included in the calculation and in the bill of materials.

If an entry was made in one fo the lines 114 - 120, it is then handled as lines 29 - 113. Only the number and price per unit can be changed. However, the whole line can be deleted with <Del> if the cursor is at the start of the line.

You go to the previous or next line with < ↑ > and < ↓ > if the cursor is at the start of the line.

You go to the first possible input position with <→>.

The line editor is valid wihtin an input field.

From the column “number” you always go first to column “price per unit”. As of position 28 you cannot skip directly to the column “price per unit”. If you want to skip a column, press only <Cr>.

5.3 Data Archive E1 B1

Read data E2 B2

”Data archive”, “Read data”
(F2→F1)

All the systems processed so far are listed in alphabetical order in a window. The arrow marking the selected system can be shifted with < >↑and < >↓ The lines are scrolled at the start and end of the window if more systems exist than can be displayed in the window.

The selection is confirmed with <Cr> and the previously processed outstations of this system are then listed. The outstations are selected according to the same principle as described above.

If an outstation selection was confirmed with <Cr>, it is loaded into user memory.

The windows can always be left with <Esc> or <F9> without a new station being loaded.

Save data E2 B2

”Data archive”,”Save data”
(F2→F2)

A station is saved on the drive currently set.

First a subindex is opened containing the name of the system if it does not yet exist. All previously generated files are then saved in this subindex (see also Chap. 3.3).

Several stations can be saved on one diskette.

Delete file E2 B2

”Data archive”,”Delete file”
(F2→F3)

As for “read data”, all the previously processed systems and then all outstations are listed in a window.

If the selection of an outstation is confirmed with <Cr>, all the files belonging to this outstation are deleted.

If all the outstations of a system are deleted, the corresponding subindex is automaticlly deleted.

The delete function can be aborted with <Esc> or <F9>.

Note The station which is just being processed (display at the upper right of screen) cannot be deleted.

Change drive **E2 B2**

”Data archive”,”Change drive”
(F2→F4)

Drives A...Z can be toggled with <F4>.

The drive identifier can also be entered directly after calling the function with <F4>.

The initial state is the drive from which PRO → U120 was started. If this setting is changed, for example from C to A, drive A is now accessed for the functions “read file”, “save file” and “delete file”.

5.4 Generation of IL and Transfer E1 B1

Start generation of IL (German) **E2 B3**

”Generation of IL and Transfer”,”Start IL generation (German)” (F3→F1)

The individual generated blocks are written into the file USTx.AWL. The file USTx.AWL is opened for writing in APPEND mode. APPEND means that additional write operations are always appended to the current end of the file.

The generation of the IL can also be called with <Alt> + <G>.

The IL is generated as follows:

Step 1 Determine maximum number of single data points

Step 2 Write macro file for function blocks into file USTx.AWL

Step 3 Set up organization block OB1

Step 4 Read macro for organization information and set up program block PB1

Step 5 Set up program blocks PB2 for processing monitored direction

Step 6 Set up program blocks PB3 for processing control direction, read in timer macros

Step 7 Read macro for monitored information and real-time information processing and set up program block PB4

Step 8 Read macro for double-point information processing and set up program block PB5

Step 9 Read macro for counter measurand processing and set up program block PB6

Step 10 Read macro for 8-bit measurand processing and set up program block PB7

Step 11 Read macro for 11-bit measurand and set up program block PB8

Step 12 Read macro for limit monitoring of measurands and set up program block PB9

Step 13 Read macros for “command output” and set up program block PB16

Step 14 Read macros for 1 of n check of the commands and conditional command output and set up program block PB12

Step 15 Read macros for “reset command output” and set up program block PB13

Step 16 Read macro for persistent command output and set up program block PB14

Step 17 Read macro for command cancellation and set up program block PB15

Step 18 Read macro for digital setpoint value output and set up program block PB10

Step 19 Read macro for analog setpoint value output and set up program block PB11

Step 20 Read file with “Control IL” and append to file USTx.AWL

Steps 5 to 20 are of course only carried out if the particular data type or function was configured.

The contents of a program block explained using the information processing for 64 items of monitored information:
The macro file for information processing is read. 8 items of information are processed in one macro. The macro is copied to the user memory of the PUTE depending on the number of items of monitored information. This is 8 times for 64 items of information.

The symbolic addresses x.y and a.b are then replaced with the actual addresses.

The symbolic address a is replaced with the KOS slot number and the address b with the contents of the KOS output byte counter. These counters are incremented by 1 after each allocation.

The port addresses are found in the file Uxxx-000.HW. First monitored information with the supplement index 0 is searched for. The search always starts with the first module. If a monitored information group is found, the symbolic address x.y is replaced with the corresponding port address. The search is continued until either all the symbolic addresses are replaced or the last module is reached.

The search begins again with the 1st module once the last module has been reached and not all the symbolic address were replaced. This time, monitored information with the supplement index 1 is searched for, then monitored information with supplement index 2, etc.

At the end, all the addresses are replaced and the block is written to the file Uxxx-000.AWL.

Start Generation of the IL (English) **E2B3**

”Generation and transfer of the IL”,”Start IL generation (English)” (F3→F2)

The German IL as described above is the basis for the English ASCII-IL. This IL is again translated into English, i.e. commands or operands which have a different name in English are replaced. In this way special English macro files are not required.

Note An English ASCII-IL cannot be read by a German AKF12 and vice versa.

Install PLC station and copy the ASCII-IL **E2 B3**

”Generation of IL and Transfer”,”Create PLC station and copy ASCII-IL”
(F3→F3)

The IL generated by PRO → U120 is passed to Dolog AKF → A120.

Step 1 PRO-U120 sets up the AKF station directory “Uxxx”[1)] in the system directory “ANLAGE.PRO”.

Step 2 PRO → U120 sets up the equipment list and writes it to the station directory.

Step 3 The file USTxxx.000.AWL[1)] is copied to the station directory under the name PRO.AWL.

Step 4 The AKF control file “AKF12.CMD” for this outsttion index is created and stored in the subdirectory “PRO-FWT”.

Step 5 The main setup file of Dolog AKF → A120 is set so that the station just installed in the PRO-FWT main menu is processed after leaving PRO-U120 and selecting the ”read ASCII-IL” function.

Warning If you again transfer a station to Dolog AKF → A120, remember that the PBs or FBs generated by PRO → U120 and the OB are overwritten. If you changed these blocks, you should first save them in another index or on diskette in order to include the changes at a later time.

1) xxx = outstation number

5.5 Printer Output E1 B1

Each printed page contains a header which includes:

- System name
- Outstation designation
- Date of generation
- Version index
- Comments
- Operator

Printout of the bill of materials E2 B4

”Printer output”,”Bill of materials”
(F4→F1)

A query is made whether a new bill of materials should be generated for the printout. If yes, all existing library files are offered for selection in order to determine the bill of materials.

If a library is selected with prices per unit, you can specify whether the total price of the station should also be printed.

Printout of the hardware configuration E2 B4

”Printer output”,”Hardware configuration”
(F4→F2)

The selected subrack(s) including the equipment mounting are printed in graphic form. The I/O module slots are designated with 1 to 18 to correspond with their slot address.

The subracks are displayed in three rows. The bottom row is only intended symbolically for optional modules and not for I/O modules.

The two upper rows contain the slots which can be addressed by the ALU. Actually both rows shoudl be displayed sequentially if no bus extension cable is used. This was not done so that the printout could be made in DIN A4 format. A configured bus extension cable is printed as connection between the 1st and 2nd rows.

Printout of the Analog Extreme Values and the Measurand Limit Table E2 B4

"Printer Output", "Analog Extreme Values, Measurand Limit Table" (F4 → F3)

The limit table for measurands and the table of the analog extreme values are printed with this function. If no table exists because the corresponding processing was not configured for measurands, this is indicated on the sc reen by a comment.

Both tables are sorted according to the slot references of the particular configured measurands. The slot reference is the software address with which a measurand is addressed under Dolog AKF. It does not correspond to the h ardware address. The first measurand of an ADU at slot 6 is thus meant by 03.01. A total of 4 hardware connections belong to this measurand.

Analog Extreme Values:

The time interval which was parametrized for determining the extreme values is first printed, followed by the table. This comprises 5 columns.

1st column Slot reference of the measurand

2nd column First of two output bytes in which the minimum value is transferred

3rd column Subaddress of the minimum value

4th column First of two output bytes in which the maximum value is transferred

5th column Subaddress of the maximum value

If both extreme values were not configured, only the QB column and the subaddress of the particular configured extreme value are filled in.

Limits:

The table contains only the measurands for which limits are to be monitored.

The limits are output sorted according to the slot references of the measurands.

Note Limits included at a later time in “extension” mode are not sorted into the table, but are appended to the end of the table. The order of the virtual events is thus maintained.

The table has two parts:

- **Information data**
  - SEAB message address
  - KOS address

- **Measurand data**
  - Slot reference
  - Limit
  - Hysteresis

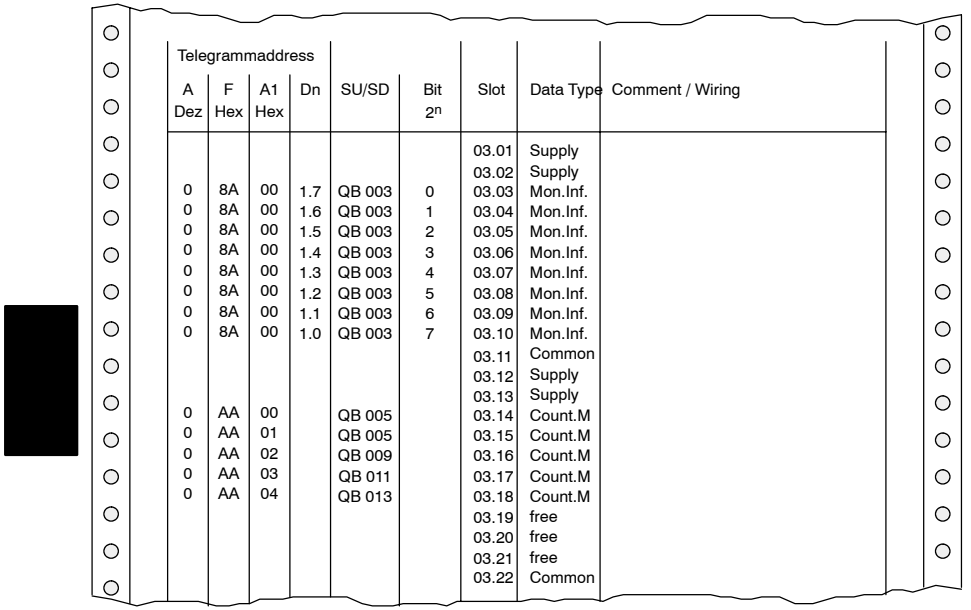
Printout of the data point list **E2 B4**

”Printer output”,”List of Data points”
(F4→F4)

After calling the ”data point list” printer function you can specify the modules for which the data point list should be printed. Inputting <*> means that the data point list is printed for all configured modules. This is also the initial state after calling the function. If you only want to print certain modules, enter the slot addresses, delimited by commas. Printer output begins after <Cr>.

The module type is printed as a header.

The data point list consists of the SEAB telegram address, the KOS address, the data type, the module link (slot) and the comment edited in the “comment data point list” menu.



Telegrammaddress A Dez	F Hex	A1 Hex	Dn	SU/SD	Bit 2^n	Slot	Data Type	Comment / Wiring
						03.01	Supply	
						03.02	Supply	
0	8A	00	1.7	QB 003	0	03.03	Mon.Inf.	
0	8A	00	1.6	QB 003	1	03.04	Mon.Inf.	
0	8A	00	1.5	QB 003	2	03.05	Mon.Inf.	
0	8A	00	1.4	QB 003	3	03.06	Mon.Inf.	
0	8A	00	1.3	QB 003	4	03.07	Mon.Inf.	
0	8A	00	1.2	QB 003	5	03.08	Mon.Inf.	
0	8A	00	1.1	QB 003	6	03.09	Mon.Inf.	
0	8A	00	1.0	QB 003	7	03.10	Mon.Inf.	
						03.11	Common	
						03.12	Supply	
						03.13	Supply	
0	AA	00		QB 005		03.14	Count.M	
0	AA	01		QB 005		03.15	Count.M	
0	AA	02		QB 009		03.16	Count.M	
0	AA	03		QB 011		03.17	Count.M	
0	AA	04		QB 013		03.18	Count.M	
						03.19	free	
						03.20	free	
						03.21	free	
						03.22	Common	

Figure 10 Excerpt of the data point list

Printout of the general outstation data and Loading E2 B4

”Printer output”,”General outstation data and Loading”
(F4→F5)

The folloiwing data are printed:

- Type of command
- Output time of the pulse commands, listed according to slot address and terminal group
- Cancel link time
- Cancel supervise time
- Malposition suppression time
- Delay time for persistent commands

- Reservations in monitored and control direction
- Module failure information n of 18
- DCF-receiver for KOS
- Assignment of organization information telegrams

On a further page, the configured module as well as its load on the 5 V and 24 V power supply are printed for each slot.

Since it is not always necessary to print all the data, you can specify separately for ”general outstation data” and ”balance of current” whether these should be printed. Only input of <J> for the particular query results in a printout of the data.

Printout of the control blocks **E2 B4**

”Printer output”,”Control blocks”

A list of the configured parameters preset by PRO → U120 is printed for each control block.

Printout of all lists **E2 B4**

”Printer output”,”All lists”
(F4→F6)

All the lists which exist are printed.

Printer selection **E2 B4**

A printer output is only possible using the parallel standard interface LPT1 with PRO → U120. Output using the serial interface is not recommended since this is already used for the link to the PLC, the EPROM programming panel and the mouse.

Expert If you want to use the printer with a serial interface nevertheless, you can direct the output in the MS-DOS level using MODE commands before PRO → U120 is started. The necessary commands can be found in the DOS manual.

Note IBM character set II must be set in the printers.

DRU 292/293 **E3 B9**

"Printer output","Printer selection","DRU 292P/293P"
(F4→F7→F1)

DRU 292 = DIN A4 Matrix printer

DRU 293 = DIN A3 Matrix printer

Near Letter Quality (NLQ) can be switched on and off with <F6>.

DRU 120 **E3 B9**

"Printer output","Printer selection","DRU 120P"
(F4→F7→F2)

DRU 120 = DIN A4 Matrix printer

Near Letter Quality can be switched on and off with <F6>.

DRU 096 **E3 B9**

"Printer output","Printer selection","DRU 96"
(F4→F7→F3)

DRU 096 = DIN A3 Cartridge printer

DRU 1200 **E3 B9**

”Printer output”,”Printer selection”,”DRU 1200”
(F4→F7→F4)

DRU 1200 = DIN A4 Laser printer

PRT 294/295

”Printer output”,”Printer selection”,”PRT294/295”
(F4 → F7 → F5)

PRT 294 = DIN A4 Printer
PRT 295 = DIN A3 Printer

Near Letter Quality can be switched on and off with <F5>.

Near Letter Quality **E3 B9**

”Printer output”,”Printer selection”,”Near Letter Quality”
(F4→F7→F6)

The matrix printers can also be switched to Near Letter Quality mode. However, the printer output is then somewhat slower.

Printer output to file **E2 B4**

”Printer output”,”Printer output to file”
(F4→D)

You are asked for the name of the file for the printer output. Drive identifier and path commands can be entered.

The file is opened in APPEND mode so that all output is written into the same file. This file is only closed when the printer menu is left. If you want to **newly** create a file with the same name, you must first delete the old file in the DOS level because otherwise the output is appended to the end of the file.

☞ **Note** All the printer control characters are written into this file.

Output in a file only makes sense for example if you want to process the datapoint list with another editor. You can also use parts of the PRO → U120 documentation in other documentation systems.

☞ **Note** The individual IL blocks are not printed with PRO → U120. The IL as generated by PRO → U120 has a special format and contains control characters which are eliminated again when read into Dolog AKF → A120. For this reason the IL blocks should be printed in Dolog AKF → A120 using the corresponding functions.

5.6 Display Bill of Materials on the Screen E1 B1

This function can give you a fast overview of the scope and price of a planned outstation. In order to determine the prices, the price per item for the individual components must be entered in the menu ”change library”. You can work with different library files.

After entering this menu, a window in which all the existing libraries are listed alphabetically appears. The arrow marking the selected library can be shifted with <↑> and <↓>. The lines are scrolled at the start and end of the window if more libraries exist than can be displayed in the window.

The bill of materials is set up from the configured modules and subracks. Furthermore, all the library positions for which a number of pieces was entered are included.

If a bill of materials was already made for an outstation, there is a query whether this should be displayed or whether a new bill of materials should be created.

Caution If a new bill of materials is to be created, remember that the current settings of the supplementary components of a library are always used for creating the bill of materials.

Chapter 6
IL-Blocks and Macros

The individual IL blocks and the macros used to create them are described in this chapter.

6.1 Summary

Warning An IL generated with PRO → U120 can be extended with user-dependent PLC functions according to the Dolog AKF → A120 rules.
If a block generated with PRO → U120 is changed, no guarantee can be given that it will function completely correctly.

The organization block is generated directly by PRO → U120; there is no macro file for this.

The final form of the function blocks are stored in the file FBS.MAC. These are only read and copied by PRO → U120 but not changed.

The program blocks are divided into three categories:

- Block is directly generated by PRO → U120
- Block is generated using a macro file
- Block is generated partly by PRO → U120 and partly by a macro file

Blocks PB2, PB17, PB18 and PB19 belong to the first category.

Blocks PB4, PB6 - PB12, PB15, PB20 and PB22 belong to the second category.

Blocks PB1, PB3, PB5, PB13, PB14, PB16 and PB21 belong to the third category.

6.1.1 List of the IL Blocks

IL Block	Meaning
OB1	Block organization
PB1	Process organization information
PB2	Process monitoring direction
PB3	Process control direction
PB4	Process monitored and real-time information
PB5	Process double-point information
PB6	Process counter measurand
PB7	Process 8-bit measurands
PB8	Process 11-bit mesurands
PB9	Limit monitoring
PB10	Process digital setpoint values
PB11	Process analog setpoint values
PB12	Check commands 1 of n
PB13	Reset command
PB14	Check persistent command
PB15	Check command for cancel
PB16	Command output
PB17	Copy EBs from 1st KOS to output marker
PB18	Copy EBs from 2nd KOS to output marker
PB19	Copy data in monitoring direction ...
PB20	Call control blocks
PB21	Call extreme value computation
PB22	Standardize extreme values ...
FB1	Check double-point information for malposition
FB2	Store double-point information on KOS
FB3	Process counter measurand
FB4	Process 8-bit measurand
FB5	Process 11-bit measurand
FB6	not used
FB7	1 of n check for commands
FB8	Output persistent command
FB9	not used
FB10	Check commands for cancellation
FB11	Limit monitoring
FB12	8-bit measurands ADU 206
FB13	11-bit measurands ADU 206
FB14	
FB15	Two-position controller
FB16	Three-position controller
FB17	Pulse-width modulator

6.1.2 List of the Markers Used

Marker	Explanation
* M1.1	set to 0
* M1.2	set to 1
* M1.3	1 = cancelled command running, 0 = pulse command or persistent command running
* M1.4	1 = start timer command output time
* M1.5	1 = output timer command output time
* M1.6	Edge detection for command output
* M1.7	1 = start timer link time
* M1.8	Output timer link time
* M1.9	1 = start timer malposition suppresion
* M1.10	1 = reset timer malposition suppression
* M1.11	Output timer malposition suppression
* M1.12	Edge detection output malposition timer
M1.13	Intermediate marker for double-point information processing
M1.14	Switching flag for 2KOS operation
* M2.1 to M3.32	Edge detection measurands
M4.1 to M4.8	Intermediate marker for double-point information check, Select commands and 8-bit measurands, Controller

If controllers are parametered, PRO-U120 reserves for each two- or three-position controller an additional marker, starting with marker 5.1. 4 additional markers are required per pulse-width modulator.

MB1	Bit counter for 1 of n check, intermediate store for persistent commands
* MB2	Measurand processing pointer
MB3	Intermediate marker, auxiliary byte
MB4	” ”
MB5	” ”
* MB6	Marker for last double-point information with malposition
* MB7 to MB40	Marker for 34 double-point information byte malposition
MB43-MB168	Output bytes into which the EBs from 3-128 are copied

MW1	Transfer word right-justified measurand, controller
MW2	Transfer word limit, controller
MW3	Transfer word hysterese value, controller
MW4	Controller
MW10 and MW11	Controller

MD1 and MD2	Pulse-width modulator

Timer 1	Command output time
Timer 2	Cancel link time
Timer 3	Malposition suppression time

If two- or three-position controllers are parametered, one additional timer is needed for each controller. Two additional timers are required for the pulse-width modulator. PRO-U120 assigns these starting with timer 5.

The markers marked with * may in no case be used in blocks other than those for which they are planned.

Definition of the KOS system marker byte

Syntax: SMB x.1
↑— KOS slot

1st bit	=	→	KOS at wrong slot
2nd bit	=	→	SEAB communications disturbed
3rd bit	=	→	Minute pulse missing
4th bit	=	→	Clock time not valid
5th bit	=	→	KOS not parametrized
6th bit	=		not defined
7th bit	=		not defined
8th bit	=		not defined

The system marker SM x.1 (node disturbed) is set as soon as the SMB x.1 is not equal to 0.

6.1.3 List of the Macro Files

Macro File		Meaning
FBS	MAC	Contains all function blocks
VERW	MAC	Generate organization information subaddress 0
KARTAUS	MAC	Generate organization information module error n of 18
MELD	MAC	Single-point and real-time information processing
DOPPEL	MAC	Double-point information processing
ZAEHL	MAC	Counter measurand processing
MESS8	MAC	Processing of 8-bit measurands
MW11	MAC	Processing of 11-bit measurands with sign
MW_ZAEHL	MAC	Counter block for measurand processing
MESS_GR	MAC	Limit monitoring for measurands
BE1_AUS	MAC	Command to group of 8 outputs
BE2_AUS	MAC	Command to group of 4 outputs (bits 0-3)
BE3_AUS	MAC	Command to group of 4 outputs (bits 4-7)
BE1_AUS2	MAC	Command to 2 x group of 8 outputs (2-pole)
BE2_AUS2	MAC	Output command on 4 x 2 outputs (2-pole)
BE4_AUS2	MAC	Command to 2 x 2 outputs (2-pole)
BE1_RSET	MAC	Reset command to group of 4 outputs
BE2_RSET	MAC	Reset command to group of 16 outputs
BEF_1AN	MAC	Call 1 of n check
BEF1_AUS	MAC	Call command output conditionally without persistent commands
BEF2_AUS	MAC	Call command output conditionally with persistent commands
F_ABEF	MAC	Generate return information check poss. organization information
P_ABEF	MAC	Check cancellation
DISW	MAC	Digital setpoint value output
ANSW	MAC	Analog setpoint value output
T_STOER	MAC	Timer for malposition suppression time
T_BEFAUS	MAC	Timer for command output time
VERKL	MAC	Timer for cancel link time
DAUERBEF	MAC	Check persistent command for 8er output group
DAUERBE1	MAC	Check persistent command for DAP 208 (2-pole)
DAUERBE2	MAC	Check persistent command for 4er output group
ZWREGFB	MAC	Function block two-position controller
ZWREG	MAC	Call two-position controller
DRREGFB	MAC	Function block three-position controller
DRREG	MAC	Call three-position controller
PBMFB	MAC	Function block pulse-width modulator
PBM	MAC	Call pulse-width modulator
EXTREM_1	MAC	Call extreme value processsing
EXTREM_2	MAC	Standardize extreme values
INTERV_M	MAC	Minute interval for extreme values
INVERV_H	MAC	Hours interval for extreme values

6.2 The Organization Block

☞ **Note** The end-of-block instruction BE is always appended automatically after the last network by PRO → U120. *** are the network separators.

```
01        :A      EB3.1     Was control command sent by 2nd KOS?
02        :A      V1
03        :JF     =LAB1
04        :A      V1        If yes, set switching flag to 1
05        :=      M 1.14
06 LAB1   :A      EB2.1     Was control command sent by 1st KOS?
07        :A      V1
08        :JF     =LAB2
09        :A      V0        If yes, reset switching flag
10        :=      M1.14
11 LAB2   :UN     M1.14     Call: copy commands and setpoint values
12        :BCC    PB17      (EBs) from 1st KOS
13        :A      M1.14     Call: copy commands and setpoint values
14        :BCC    PB18      (EBs) from 2nd KOS
15        :BC     PB1       Call: module check
16        :BC     PB2       Call: process monitoirng direction
17        :BC     PB3       Call: process control direction
18        :BC     PB19      Call: copy ABs for 2nd KOS
:...
:BE
```

- Lines 1 ... 14 and 18 are only generated if the IL was generated for 2 KOS modules.
- Line 15 is always generated.
- Line 16 is only generated if data was configured in monitoring direction.
- Line 17 is only generated if data was configured in control direction.

6.3 The program blocks

☞ **Note** The end-of-block instruction BE is always appended automatically after the last network by PRO → U120. *** are the network separators.

6.3.1 Program Block PB1

```
01        : A     V0      Set marker 1 to zero
02        : =     M1.1
03        : A     V1      Set marker 2 to one
04        : =     M1.2
          : ***
05        : A     V0      Set first byte of KOS interface to zero

06        : =     MB1
07        : =     QB1.1   (D2-byte of the system information A1 = 0)
08        : =     QB1.2   (D1-byte of the system information A1 = 0)
09        : =     QB1.3   (D2-byte of the system information A1 = 1)
10        : =     QB1.4   (D1-byte of the system information A1 = 1)
11        : =     QB1.5   (D2-byte of the system information A1 = 2)
          : ***
12        : LBB   SM10
13        : DBB   ANZ2
14        : SHL   K6
15        : O     QB1.2
16        : =     QB1.2
          : ***
17        : A     SM32    Error in module at slot 3 ?
18        : JF    =LAB    if not, check next module
19        : A     V2      Enter slot 2 in organization information
20        : =     QB1.1
21        : A     MB1     Increment error counter
22        : INC
23        : =     MB1
24 LAB    : ***
```

```
25        : A     SM33     Error in module at slot 3 ?
26        : JF    =LAB     if not, check next module
27        : A     V3       Enter slot 3 in organization information
28        : =     QB1.1
29        : A     QB1      Increment error counter
30        : INC
31        : =     MB1
32 LAB    : ***
33        : LD    MB1      Error counter larger than 1 ?
34        : >     V1
35        : JF    =LAB     if not, skip to end of network
36        : A     KH20     if yes, set bit 2^5 in organization information
37        : O     QB1.1
38        : =     QB1.1
          : ***
39        : A     SM2.1    Module failure n of 18
40        : O     SM32
41        : JF    =LAB
42        : A     Y2       Set second bit for slot 2
43        : O     QB1.3
44        : =     QB1.3
45 LAB    : ***
46        : A     SM3.1
47        : O     SM33
48        : JF    =LAB
49        : A     V4       Set third bit for slot 3
50        : O     QB1.3
51        : =     QB1.3
52 LAB    : ***
          : BE
```

Macro file VERW.MAC

```
* Organization information module failed 1 of 18
          A     SMy;
          SPZ   =LAB;
          U     Kx;
          =     QBk.y;
          U     MB1;
          INC;
          =     MB1;
LAB   :   ***;
```

Macro file KARTAUS.MAC

```
* Organization information module failed n of 18
          U     SMx.1;
          O     SMy;
          SPZ   =LAB;
          U     Kx;
          O     ABk.y;
          =     ABk.y;
LAB   :   ***;
```

Lines 1 to 16 are generated directly by PRO → U120. Lines 9 - 11 are only generated if “Module failure information n of 18” was configured.

Lines 17 to 32 are read in as a macro (VERW.MAC). Lines 33 - 38 are generated by PRO → U120. The organization information module failure 1 of 18 is generated here. The relevant slot is entered in the organization information A1 = 0 binary coded. If several modules fail, the last slot position is entered and in addition the sixth bit is set.

The module failure information is generated n of 18 in lines 39 - 52. Slots 1 - 16 are entered in the 3rd and 4th bytes of the KOS (organization information A1 = 1), slots 17 and 18 in the 5th byte of the KOS (organization information A1 = 2). The macro KARTAUS.MAC is read in for this purpose.

6.3.2 Program Block PB2

```
01      : BC    PB4     Call: single-point information processing
        : ***
02      : BC    PB5     Call: double-point information processing
        : ***
03      : BC    PB6     Call: counter measurand processing
        : ***
04      : BC    PB7     Call: measurand processing 8-bit
        : ***
05      : BC    PB8     Call: measurand processing 11-bit
        : ***
```

The block is generated by PRO → U120. Only those block calls are generated whose data type was configured. If for example no 8-bit measurand was configured, line 4 is omitted.

6.3.3 Program Block PB3

```
01      : BC    PB10    Call: digital setpoint value processing
        : ***
02      : BC    PB11    Call: analog setpoint value processing
        : ***
03      : A     V0
04      : =     M1.4    Input marker Reset command output timer
        : ***
05      : BC    PB12    Call: Check command 1 of n
        : ***
06      : A     M1.3    If marker = 1,
07      : BCC   PB15    Check command for cancellation
        : ***
08      : A     M1.4    If marker = 1,
09      : TEP   T1      Start command output time
10      : DTB   100MS
11      : L     TSW1
12      : A     M1.8    If timer output link time = 1,
13      : R     T1      Reset timer command output time
14      : =     M1.5    0 = Command output time expired
```

```
      : ***
15    : A     M1.7     If marker = 1,
16    : TS    T2       Start timer link time
17    : DTB   100MS
18    : LD    V2       Link time = 200 msec (variable)
19    : AN    M1.5     If command output time expired,
20    : R     T2       Reset timer link time
21    : =     M1.8     1 = link time expired
      : ***
22    : AN    M1.5     Command output time expired
23    : A     M1.3     1 = cancelled command
24    : AN    M1.7     Link time expired
25    : JF    =LAB1    If not, skip to LAB1
26    : A     V64      7th bit in organization information (A1=0)
27    : O     QB1.1    Set, i.e. no return information for
28    : =     QB1.1    cancelled command
29 LAB1 : ***
30    : AN    M1.5     If command output time expired,
31    : BCC   PB13     Call: reset command output
      : BE
```

Macro file T_BEFAUS.MAC

```
* Timer for command output time
      U     M1.4;
      SV    T1;
      DZB   100MS;
      L     TSW1;
      U     M1.8;
      R     T1;
      =     M1.5;
      ***;
```

Macro file VERKL.MAC

```
* Link time for cancelled commands
        U       M1.7;
        SS      T2;
        DZB     100MS;
        L       Kt;
        UN      M1.5;
        R       T2;
        =       M1.8;
        ***;
```

Macro file F_ABEF.MAC

```
* Check: No return information for cancelled command
        UN      M1.5;
        U       M1.3;
        UN      M1.7;
        SPZ     =LAB1;
        U       K64;
        O       ABk.y;
        =       ABk.y;
LAB1:   ***;
```

Lines 1 and 2 are only generated by PRO → U120 if setpoint value output was configured. Lines 3 - 31 only if command output was configured.

Lines 3 to 7 are generated directly by PRO → U120.

The macro T_BEFAUS.MAC is read in for lines 8 to 14.

The macro VERKL.MAC is read in for lines 15 to 21 and the variable t is replaced with the cancel link time.

The macro F_ABEF.MAC is read in for lines 22 to 29 and variables k.y are replaced with the address of the 1st KOS output byte.

Lines 30 and 31 are again generated directly by PRO → U120.

Note Lines 6 and 7 as well as 15 to 29 are only generated if actively cancelled commands are configured.

6.3.4 Program Block PB4

```
01      : LBB   I8.1        Load inputs 1 to 8
02      : DBB   CNT8
03      : =     QB1.3       and assign KOS output byte
        : ***
04      : LBB   I8.9        Load inputs 9 - 16
05      : DBB   CNT8
06      : =     QB1.4       and assign next KOS output byte
        : ***
        : BE
```

Macro file MELD.MAC

```
* Transfer 8 MELDUNGEN (items of monitored information) to KOS
        LBB     Ex.y;
        DBB     ANZ;
        =       ABa.b
        ***;
```

Monitored information is always assigned byte by byte. The variables x.y are replaced by the addresses of the particular input modules, variable a with the KOS slot address and variable b with the AB pointer.

☞ **Note** Real-time information is handled like normal monitored information in the IL. This information is only given a time stamp in the KOS.

6.3.5 Program Block PB5

```
01          : A     V0        Marker for malposition timer
02          : =     M1.9      Start reset
03          : A     V0        Marker for malposition timer
04          : =     M1.10     Stop reset
            : ***
05          : A     V0        Load double-point information code in MB4
06          : =     MB0.4
07          : BC    FB1       Call: Check malposition
08 NAME     : DOPPELM
09 IN       : I2.1            Transfer inputs 2.1 to 2.8
10 CNT      : CNT 8
11 DMNR     : MB0.7           Transfer double-point information marker byte
12 DMMB     : MB0.4           Transfer double-point information code
13          : LD    MB0.7     If the double-point information marker byte
14          : ==    V0        is equal to 0, M 1.13 is set to 1
15          : =     M1.13
16          : AN    M1.11     If the malposition timer
17          : A     M1.12     expired in the last IL scan
18          : O     M1.13     or M1.13 is set,
19          : BCC   FB2       then call: restore DM
20 NAME     : DM-UMSP
21 IN       : I2.1            Transfer double-point information
22 CNT      : CNT 8
23 QB       : QB1.7           Transfer KOS output byte
24 MERK     : MB0.7           Transfer double-point information marker byte
            : ***
25          : A     M1.11     Store current timer output setting in
26          : =     M1.12     M 1.12
27          : A     M1.9      Input marker malposition timer
28          : TOF   T3
29          : DTB   100MS
30          : LD    V200      Malposition suppression time x 100msec
31          : A     M1.10     M 1.10 = 1 = Reset for timer
32          : R     T3
33          : =     M1.11     Output timer
            : ***
            : BE
```

Macro file DOPPEL.MAC

```
* Double-point information with malposition suppression
        L       Kk;
        =       MB0.4;
        BA      FB1
        (
        Ex.y,
        ANZ 8,
        MBm,
        MB 0.4
        );
        L       MBm;
        ==      K 0;
        =       M1.13;
        UN      M1.11;
        U       M1.12;
        O       M1.13;
        BAB     FB2
        (
        Ex.y,
        ANZ 8,
        ABa.b,
        MBm
        );
        ***;
```

Macro file T_STOER.MAC

```
* Timer for malposition suppression
        U       M1.11;
        =       M1.12;
        U       M1.9;
        SA      T3;
        DZB     100MS;
        L       Kt;
        A       M1.10;
        R       T3;
        =       M1.11;
        ***;
        BE;
```

The markers which start or stop the malposition timer are reset in lines 1 to 4. If a malposition is recognized, marker M 1.9 is set to 1 and thus starts the timer in the last network. If the malposition no longer exists, the marker M 1.10 is set to 1 and thus stops the timer in the last network. If the timer expired or stopped, the monitored information is transferred to the KOS.

Each byte contains 4 x 2 items of monitored information, which are checked for malposition. Each group of two has a code from 0 to n. The code for the first group within the monitored information byte is passed to the function block. The first monitored information byte contains the groups 0, 1, 2 and 3, so that a 0 is transferred. The second monitored information byte contains the groups 4 to 8, so that the 4 is transferred, etc. The code is necessary to find out which malposition last started the timer because the timer may only be reset when this malposition no longer exists.

In order to find out whether a malposition was already recognized, there is a double-point information marker byte parallel to each monitored information byte. This is necessary to prevent the same malposition from starting the timer for the suppression time again in the next IL scan. A bit is reserved for each group of two in this marker byte. The corresponding bit is set as soon as a malposition is recognized.

When the function block FB1 is called, there is a check whether the double-point information marker byte is 0. 0 means that no bit is set, i.e. no malposition. If this is the case or if the timer for the suppression time has expired (marker M 1.11 = 1), the monitored information is restored in the function block FB2.

The information byte, the KOS output byte and the double-point information marker byte are transferred to the function block FB2. The marker byte is reset in the FB and the information byte is transferred to the KOS.

Lines 1 to 4 were generated directly by PRO → U120. Lines 5 to 24 were generated using the macro DOPPEL.MAC and lines 25 to 33 using the macro T_STOER.MAC.

6.3.6 Program Block PB6

```
01        : BC     FB3        Call: counter measurand processing
02 NAME:  ZAEHLWER
03 EIN    : I2.9               Transfer counter measurand input to FB3
04 FLA    : M2.1               Marker for edge detection
05 OUT    : QB1.11             Two KOS output bytes in which
06 CNT    : CNT 2              the counter measurand is stored
          : ***
07        : BC     FB3
08 NAME:  ZAEHLWER
09 EIN    : I2.10
10 FLA    : M2.2
11 OUT    : QB1.13
12 CNT    : CNT 2
          : ***
          : BE
```

Macro file ZAEHL.MAC

```
* Counter measurands
          BA       FB3 (
          Ex.y,
          Mv,
          ABa.b,
          ANZ 2);
          ***;
```

The macro file is copied depending on the number of counter measurands. x.y are then replaced with the terminal address. The variable v is replaced with the contents of the edge detection counter and the counter is incremented. The variables a.b are replaced with the KOS slot address and the output byte.

6.3.7 Program Block PB7

```
01        : LD     MB 2        Marker for measurands to be converted
02        : ==     V1          Query (1st ADU)
03        : BCC    FB4
04 NAME:  205/8BOV
05 IW     : IW6.1    Transfer measurand
06 OUT    : QB1.15              Transfer KOS output byte
          : ***
07        : LD     MB2         Marker for measurands to be converted
08        : ==     V1          Query (1st ADU)
09        : BCC    FB4
10 NAME:  205/8BOV
11 IW     : IW6.2    Transfer measurand
12 OUT    : QB1.16              Transfer KOS output byte
          : ***
          .
          .
          .
13        : LD     MB2         Marker for measurands to be converted
14        : ==     V2          Query (2nd ADU)
15        : BCC    FB4
16 NAME:  205/8BOV
17 IW     : IW7.2    Transfer measurand
18 OUT    : QB1.19              Transfer KOS output byte
          : ***
19        : LD     MB 2
20        : ==     V 2
21        : JF     =LAB
22        : LD     V0
23        : =      MB2
24 LAB    : A      MB2
25        : INC
26        : =      MB2
          : BE
```

Macro file MESS8.MAC

```
* 8-bit measurands
        L       MB2;
        ==      Kk;
        BAB     FB4 (
        EWx.y,
        ABa.b
        );
        ***;
```

Macro file MW_ZAEHL.MAC

```
* Counter for increment and reset measurand modules
        L       MB2;
        ==      Kk;
        SPZ     =LAB;
        L       K0;
        =       MB2;
LAB     :
        U       MB2;
        INC;
        =       MB2;
        ***;
```

Lines 1 to 18 are generated by the macro file MESS8.MAC and lines 19 to 26 by the macro file MW_ZAEHL.

The measurands from the ADU must first be converted in the IL. This is done in the FB4 for 8-bit measurands without a sign. In order to keep the IL runtime as short as possible, only the measurands of one module are converted in one IL scan. Marker byte MB2 is used to ask which measurand module should be converted and reloaded.

In the example, there is a skip to the next module between lines 12 and 13. In fact, this location contains the networks for the measurands.
6.3 ... 6.4.

Constant k in the macro is replaced with the reload counter. The counter is incremented by one for each new module. The variables x.y are replaced with the measurand input and variables a.b with the KOS slot address and the KOS output byte.

The module counter is interrogated in lines 19 to 26. If the last module was converted and restored, the counter is again set to zero (NULL), otherwise it is incremented by 1.

The constant k in the macro is replaced with the reload counter of the last measurand module.

6.3.8 Program Block PB8

```
01        : LD    MB2       Marker for measurands to be converted
02        : ==    V1        Interrogate (1st ADU)
03        : BCC   FB5
04 NAME:  QDU205
05 IW     : IW6.1           Transfer measurand
06 OUT    : QB1.15          Transfer two KOS output bytes for one
07 CNT    : CNT 2           11-bit measurand
          : ***
```

Macro file MW11.MAC

```
* 11-bit measurands + sign
          L       MB2;
          ==      Kk;
          BAB     FB 5(
          EWx.y,
          ABa.b,
          ANZ 2
          );
          ***;
```

These are generated as for 8-bit measurands, but two KOS output bytes must be transferred for reloading. Since these are signed measurands, the conversion is carried out in a different function block (FB5) than for 8-bit measurands.

6.3.9 Program Block PB9

```
01        : LD    V30000    Copy upper limit to
02        : =     MW2       marker word
03        : LD    V29990    Copy limit less hysterese
04        : =     MW3       to marker word
05        : LD    V1        Copy code for monitored
06        : =     MB4       information bit to marker byte
07        : BC    FB11      Call limit processing
08 NAME:  GRW_11B           for 11-bit measurands
09        : M1.2            Transfer code for upper limit
10        : QB1.005         Transfer converted measurand from
11        : CNT 2           KOS area (2 bytes for 11-bit MW)
12        : MW2
13        : MW3
14        : QB1.007         KOS output byte for limit information
15        : MB4
          : ***;
16        : LD    V-1000    Copy lower limit to
17        : =     MW2       marker word
18        : LD    V-990     Copy lower limit plus
19        : =     MW3       hysterese to marker word
20        : LD    V2        Copy code for monitored
21        : =     MB4       information bit to marker byte
22        : BC    FB11      Call limit monitoring
23 NAME:  GRW_11B
24        : M1.1            Transfer code for lower limit
25        : QB1.005         of converted measurand from KOS
26        : CNT 2           area
27        : MW2
28        : MW3
29        : QB1.007         KOS output byte for limit information
30        : MB 4
          : ***;
31        : LD    V240      Upper limit to marker byte
32        : =     MB3
33        : LD    V235      Upper limit less hysterese
34        : =     MB4       to marker byte
35        : LD    V4        Code for limit information in
36        : =     MB5       marker byte
```

```
37        : BC    FB1       Call for limit monitoring
38 NAME:  GRW               8-bit measurands
39        : M1.2            Code of upper limit
40        : QB1.003         Reloaded measurand from KOS area
41        : CNT 1
42        : MW 2
43        : MW 3
44        : QB1.007         KOS output byte for limit information
45        : MB 4
          : ***
          : BE
```

Macro file MESS_GR.MAC

```
* Limit monitoring of measurands 11-bit
          L       Kgr;
          =       MW0.2;
          L       Khy;
          =       MW0.3;
          L       Kbit;
          =       MB0.4;
          BA      FB11 (
          M1.1,
          ABx.y,
          ANZz,
          MW0.2,
          MW0.3,
          ABa.b,
          MB0.4
          );
          ***;
```

Since no constants can be transferred to function blocks, the relevant limit and the hysterese value must first be reloaded into marker words. Furthermore, the constant which sets or deletes the corresponding information bit if a limit value overflows or a hysterese value underflows is transferred in a further byte.

The limits are monitored with the converted measurands, which are read from the relevant KOS output byte. One byte is transferred for 8-bit measurands with the instruction CNT 1. Two successive bytes are passed for 11-bit measurands with the instruction CNT 2. The variable z in the macro is replaced accordingly.

Furthermore, the KOS output byte in which the particular monitored information bit is to be set or deleted is transferred.

Transferring the marker 1.2, which is always set to 1, informs the function block that the values transferred are the upper limits. Marker 1.1 is overwritten in der macro file.

6.3.10 Program Block PB10

```
01      : LD    IB1.3       Load KOS input byte
02      : TBB   Q3.1        and output to outputs 1 - 8
03      : DBB   CNT 8
        : ***
04      : LD    IB1.4       Load KOS input byte
05      : TBB   Q3.9        and output to outputs 9 - 16
06      : DBB   CNT 8
        : ***
        : BE
```

Macro file DISW.MAC

```
* Digital setpoint values
        L       EBe.b;
        TBB     Ax.y;
        DBB     ANZ 8;
        ***;
```

A digital 16-bit setpoint value is processed using two networks. A KOS input byte is reloaded on 8 outputs in each network.

Variables e.b are replaced with the KOS slot address and the IB pointer. Variable x.y is replaced with the address of the 1st or 9th module output.

6.3.11 Program Block PB11

```
01      : LBW   IB1.5       Load two KOS input bytes
02      : DBB   CNT 2
03      : =     QW7.1       and reload to an analog output
        : ***
        : BE
```

Macro file ANSW.MAC

```
* Analog setpoint values
        LBW     EBe.b;
        DBB     ANZ 8;
        =       AWx.y;
        ***;
```

An analog setpoint value is read in from two KOS input bytes and output to one analog output.

Variables e.b are replaced with the KOS slot address and the IB pointer. Variable x.y is replaced with the address of the corresponding analog output.

6.3.12 Program Block PB12

```
01        : A      V0          Reset command counter
02        : =      MB1
          : ***
03        : BC     FB7         Call 1 of n check for
04 NAME:  UP1AUSN              command otuput
05 INPU :  IB1.001 Transfer KOS input byte
06 OUTP:  MB1                  Transfer command counter
          : ***
07        : BC     FB7
08 NAME:  UP1AUSN
09 INPU :  IB1.002
10 OUTP:  MB1
          : ***
11        : LD     MB1         Load command counter and if 1 command
12        : ==     V1          was transferred from the KOS
13        : AN     M1.5        and if the command output timer expired,
14        : =      M1.4        set input marker for the timer
          : ***
15        : LD     MB1         if command from the KOS is waiting and
16        : ==     V1          the input marker of the command output timer
17        : AN     M1.6        was 0 in the last IL scan,
18        : BCC    PB14        call check for persistent command
19        : A      M1.4        Store state of the timer input marker
20        : =      M 1.6       in M 1.6
          : ***
21        : A      M 1.4
22        : BCC    FB9         Call command output
23 NAME:  BEFAUS
          : BE
```

Macro file BEF_1AN.MAC

```
* Command output  Call 1 of n check
          BA       FB7(
          EBe.b,
          MB1);
          ***;
```

Macro file BEF1_AUS.MAC

```
* Command output conditional call
        L       MB1;
        ==      K1;
        UN      M1.5;
        =       M1.4;
        ***;
        U       M1.4;
        BAB     FB9 ();
        BE;
```

Macro file BEF2_AUS.MAC

```
* Command output conditional call
        L       MB1;
        ==      K1;
        UN      M1.5;
        =       M1.4;
        ***;
        L       MB1;
        ==      K1;
        UN      M1.6;
        BAB     PB14;
        U       M1.4;
        =       M1.6;
        ***;
        U       M1.4;
        BAB     FB9 ();
        BE;
```

Lines 1 and 2 are generated by PRO → U120. Lines 3 to 10 are generated from macro BEF_1AN.MAC and lines 11 to 23 from macro BEF2_AUS.MAC.

The individual input bytes of the KOS are transferred to the function block FB7 in lines 3 to 10. This checks whether a command is to be output. MB1 = 0 → no command output, MB1 = 1 → command output, MB1 > 1 → no command output, because several commands may not be output simultaneously.

If persistent commands were configured, lines 11 to 23 are generated by the macro file BEF2_AUS.MAC. It contains the call for a check for persistent command output. If no persistent commands were configured, the macro BEF1_AUS.MAC is read in and lines 15 to 20 are omitted.

A command is only output if the output of the command output timer is zero (NULL), i.e. any previous command output has been terminated (lines 11 to 14).

If a command is transferred by the KOS, PB14 checks whether it is a persistent command and whether it was already output. If this is the case, the command output timer is again started. Since this is only possible with an edge change at the timer input, one must ensure that the input marker was 0 in the last IL scan (lines 17, 19 and 20).

The command output is called in lines 21 to 23.

6.3.13 Program Block PB13

```
01      : A     V0
02      : =     M1.3
03      : =     M1.7        Reset input marker timer
        : ***               link time
04      : LD    V0
05      : TBB   Q4.1        Reset outputs
06      : DBB   CNT 8
        : ***
07      : LD    V0
08      : TBB   Q4.9        Reset outputs
09      : DBB   CNT 8
        : ***
10      : LD    V0
11      : TBB   Q8.1        Reset outputs
12      : DBB   CNT 4
        : ***
        : BE
```

Macro file BE1_RSET.MAC

```
* Reset commands on 4-output modules
        L       K0;
        TBB     Ax.y;
        DBB     ANZ 4;
        ***;
```

Macro file BE2_RSET.MAC

```
* Reset commands on 16-output modules
        L       K0;
        TBB     Ax.y;
        DBB     ANZ 8;
        ***;
```

Lines 1 to 3 are generated by PRO → U120.

The macro BE1_RSET.MAC is read in to reset the command output for modules with 4 outputs (lines 10 to 12).

Since commands for modules with 16 outputs can be assigned bytewise, they are also reset bytewise. Macro BE2_RSET.MAC is read in for this purpose (lines 4 to 9).

Check for 1-pole command output

```
01        : LD     V0
02        : TBB    M4.1
03        : DBB    CNT 8
          : ***
04        : BC     FB8
05 NAME:  DAUERBE
06 INPU :  IB1.001 Check KOS input byte for
07 MERK:  M1.2
08 AUS  :  Q4.1                agreement with 8 outputs
09 CNT  :  CNT 8               of an output module
          : ***
10        : BC     FB8
11 NAME:  DAUERBE
12 INPU :  IB1.002 Transfer KOS input byte
13 MERK:  M1.2                 M 1.2 means: 1st to 4th bits in IB
14 AUS  :  Q5.1                are compared with 4 outputs
15 CNT  :  CNT 4
          : ***
16        : BC     FB8
17 NAME:  DAUERBE
18 INPU :  IB1.002 Transfer KOS input byte
19 MERK:  M1.1                 M 1.1 means: 5th to 8th bits in IB
20 AUS  :  Q6.1                are compared with 4 outputs
21 CNT  :  CNT 4
          : ***
          : BE
```

Macro file DAUERBEF.MAC

```
* Check whether persistent command should still be output
          BA       FB8 (
          EBe.b,
          M1.m,
          Ax.y,
          ANZ z
          );
          ***;
```

Each input byte of the KOS in which persistent commands are transferred is compared with the corresponding outputs. This is done in function block FB8.

Since only half a byte is compared in 4-output modules, an additonal marker which shows whether the 1st to 4th or 5th to 8th bits are meant must be transferred to the function block. The 5th to 8th bits are shifted right by 4 positions in the function block. This permits a direct comparison with the outputs. The shift is carried out by transferring the marker 1.1 (is always set to 0) (lines 16 to 21). If the first half-byte or a whole byte are to be checked, marker 1.2 is transferred (lines 4 to 15).

Check for 2-pole command output

```
01        : LD      V0
02        : TBB     M4.1        Set marker string from M4.1 to 4.8
03        : DBB     CNT 8       to NULL (zero)
          : ***
04        : A       Q2.1        Save 1st command output
05        : =       M4.1        to marker 4.1
06        : A       Q2.3        Save 2nd command output
07        : =       M4.2        to marker 4.2
08        : BC      FB8
09 NAME:  DAUERBE
10 INPU :         IB1.1
11 MERK:          M1.2
12 AUS  :         M4.1
13 CNT  :         CNT 8
          : ***
14        : A       Q3.1        Save 3rd command output
15        : =       M4.3        to marker 4.3
16        : A       Q3.3        Save 4th command output
17        : =       M4.4        to marker 4.4
18        : BC      FB8
19 NAME:  DAUERBE
20 INPU :         IB1.1
21 MERK:          M1.2
22 AUS  :         M4.1
23 CNT  :         CNT 8
          : ***
          : BE
```

Macro file DAUERBE1.MAC
Check wether persistent commands should stll be output (2-pole DAP 208)

```
L       K 0;
TBB     M 4.1;
DBB     ANZ 8;
U       A x.y;
=       M 4.z;
U       A x.y;
=       M 4.z;
U       A x.y;
=       M 4.z;
U       A x.y;
=       M 4.z;
BA      FB8 (
EB e.b,
M1.2,
M4.1,
ANZ 8,
);
***;
```

Macro file DAUERBE2.MAC
* Check whether persistent command should still be output (2-pole, DAP 204)

```
U       Ax.y;
=       M4.z;
U       Ax.y;
=       M4.z;
BA      FB8 (
EBe.b,
M1.2,
M4.1,
ANZ 8
);
***;
```

If 2-pole command output was configured, the macro file DAUERBE2.MAC is read in for the check for a persistent command for the 4-output modules DAP 204 and DAP 212.

Since two outputs which lie under one another always form one command, the 1st and 3rd outputs of a module are copied to the position of a marker string which the corresponding command has in the input byte of the KOS. The function block then checks the input byte and the marker string are then checked for agreement.

This is not necessary for 16-output modules since the upper 8 outputs form the 2-pole commands there together with the lower 8 outputs. Therefore only the upper 8 outputs need be compared with the input byte. As with the 1-pole command output, this is done using the macro DAUERBEF.MAC.

6.3.15 Program Block PB15

Cancellation check for 1-pole command output

```
01        : BC     FB10
02 NAME:  P-ABEF
03 AUSG:  Q8.1              8 outputs defined as
04 CNT1 : CNT 8             cancelled command output
05 EING : I7.1              are compared with
06 CNT2 : CNT 8             8 inputs defined as return information
          : ***
07        : BC     FB10
08 NAME:  P-ABEF
09 AUSG:  Q9.1              4 command outputs of a DAP 212
10 CNT1 : CNT 4
11 EING : I9.1              are compared with the 4
12 CNT2 : CNT 4             first inputs
          : ***
          : BE
```

Macro file P_ABEF.MAC

```
* Check command for cancellation
          BA        FB10 (
          Ax.y,
          ANZ a,
          Ez.y,
          ANZ a
          );
          ***;
```

In the check for cancellation, the outputs are checked for agreement with the corresponding inputs. The transfer parameters CNT1 and CNT2 define whether 4 or 8 I/Os should be checked.

Cancellation check for 2-pole command output

```
01        : BC     FB10
02 NAME:  P-ABEF
03 AUSG:  Q9.1              one command output
04 CNT1 :  CNT 1
05 EING :  I9.1             is compared with the
06 CNT2 :  CNT 1            corresponding    return information
          : ***
07        : BC     FB10
08 NAME:  P-ABEF
09 AUSG:  Q9.3              one command output
10 CNT1 :  CNT 1
11 EING :  I9.2             is compared with the
12 CNT2 :  CNT 1            corresponding return information
          : ***
          : BE
```

The basis of the cancellation check is the macro file P_ABEF.MAC, also for 2-pole command output. However, since the 1st and 2nd as well as the 3rd and 4th outputs always form one command in the 4-output modules, a 1:1 comparison with the inputs is no longer possible. For this reason, only one output is compared with one input per network, whereby the number of networks is doubled.

6.3.16 Program Block PB16

1-pole command output

```
01        : A      IB 1.1          Check if one of the commands
02        : A      VH 0F           1 ... 4 is set
03        : ==     V 0
04        : JT =LAB
05        : L D    IB 1.1          If yes, output to first
06        : TBB    Q 2.1           4-output module
07        : DBB    CNT 4
08        : LD     V 03            Write command output time in timer
09        : =      TSW 1           setpoint value
10 LAB    : ***
11        : A      IB 1.1          Check if one of the commands
12        : A      KHF0            5 ... 8 is set
```

```
13        :  ==    V0
14        :  JT    =LAB
15        :  LD    IB1.1     If yes, copy to bit string
16        :  TBB   M4.1
17        :  DBB   CNT 8
18        :  LBB   M4.5      output upper 4 bits to second
19        :  DBB   CNT 4     4-output module
20        :  TBB   Q3.1
21        :  DBB   CNT 4
22        :  LD    V300      Write command output time in timer
23        :  =     TSW1      setpoint value
24        :  A     V1
25        :  =     M1.3      Set code for cancelled commands
26 LAB    :  ***
27        :  LD    IB1.2     Check if one of the commands
28        :  ==     V0       9 ... 16 is set
29        :  JT    =LAB
30        :  LD    IB1.2     If yes, output the 8 bits to the upper
31        :  TBB   Q4.1      outputs of a 16-output
32        :  DBB   CNT 8     module
33        :  LD    V20       Write command output time in timer
34        :  =     TSW1      setpoint value
35 LAB    :  ***;
36        :  LD    IB1.3     Check if one of the commands
37        :  ==    V0        17 ... 24 is set
38        :  JT    =LAB
39        :  LD    IB1.3     If yes, output the 8 bits to the lower
40        :  TBB   Q4.9      outputs of a 16-output
41        :  DBB   CNT 8     module
42        :  LD    V20       Write command output time in timer
43        :  =     TSW1      setpoint value
44 LAB    :  ***
          BE
```

2-pole command output

```
01        : A     IB1.1          Check if command 1 or 2
02        : A     VH03           is set
03        : ==    V0
04        : JT    =LAB
05        : LD    IB1.1          If yes, copy commands to
06        : TBB   M4.1     bit string
07        : DBB   CNT 8
08        : A     M4.1     Output command 1 to
09        : =     Q2.1     outputs 1 and 2
10        : =     Q2.2
11        : A     M4.2     Output command 2 to
12        : =     Q2.3     outputs 3 and 4
13        : =     Q2.4
14        : LD    V03      Write command output time in
15        : =     TSW1     timer setpoint value
16 LAB    : ***
17        : A     IB1.1    Check if command 3 or 4
18        : A     VH0C     is set
19        : ==    V0
20        : JT    =LAB
21        : LD    IB1.1    If yes, copy command to
22        : TBB   M4.1     bit string
23        : DBB   CNT 8
24        : A     M4.3     Output command 3 to
25        : =     Q3.1     outputs 1 and 2
26        : =     Q3.2
27        : A     M4.4     Output command 4 to
28        : =     Q3.3     outputs 3 and 4
29        : =     Q3.4
30        : LD    K300     Write command output time in
31        : =     TSW1     timer setpoint value
          : A     K1
33        : =     M1.3     Set code for cancelled commands
34 LAB    : ***
35        : LD    IB1.2    Check if one of the commands
36        : ==    V0       9 ... 16 is set
37        : JT    =LAB
38        : LD    IB1.2    If yes, output parallel to the
39        : TBB   Q4.1     outputs 1 ... 8 and
40        : DBB   CNT 8
```

```
41        : TBB   Q4.9        outputs 9 ... 16
42        : DBB   CNT 8
41        : LD    V20         Write command runtime in
42        : =     TSW1        timer setpoint value
43 LAB    : ***;
   BE
```

Macro file BE1_AUS.MAC

```
* Output command to 8 outputs
        L       EBe.b;
        ==      K0;
        SP      =LAB;
        L       EBe.b;
        TBB     Ax.y;
        DBB     ANZ 8;
        L       Kt;
        =       TSW1;
        LAB:
        ***;
```

Macro file BE2_AUS.MAC

```
* Output commands to 4 outputs LOW
        U       EBe.b;
        U       KH0F;
        ==      V0;
        SP      =LAB;
        L       EBe.b;
        TBB     Ax.y;
        DBB     ANZ 4;
        L       Kt;
        =       TSW1;
LAB:    ***;
```

Macro file BE3_AUS.MAC

```
* Output commands to 4 outputs HIGH
        U       EBe.b;
        U       KHF0;
        ==      K0;
        SP      =LAB;
        L       EBe.b;
        TBB     M4.1;
        DBB     ANZ 8;
        LBB     M4.5;
        DBB     ANZ 4;
        TBB     Ax.y;
        DBB     ANZ 4;
        L       Kt;
        =       TSW1;
LAB:    ***;
```

Macro file BE1_AUS2.MAC

```
* Output command to 2 x 8 outputs (2-pole)
        L       EBe.b;
        ==      K0;
        SP      =LAB;
        L       EBe.b;
        TBB     Ax.y;
        DBB     ANZ 8;
        TBB     Ax.y;
        DBB     ANZ 8;
        L       Kt;
        =       TSW1;
LAB:    ***;
```

Macro file BE2_AUS2.MAC

* Output command on 4 x 2 outputs (2-pole)

```
      U     EB e.b;
      U     KH h;
      ==    K0;
      SP    =LAB;
      L     EB e..b;
      TBB   M 4.1;
      DBB   ANZ 8;
      U     M 4.m;
      =     A x.y;
      =     A x.y;
      U     M 4.m;
      =     A x.y;
      =     A x.y;
      U     M 4.m;
      =     A x.y;
      =     A x.y;
      U     M 4.m;
      =     A x.y;
      =     A x.y;
      L     K t;
      =     TSW 1;

LAB:  ***;
```

Macro file BE4_AUS2.MAC

* Output command to 2 x 2 outputs (2-pole)

```
      U     EBe.b;
      U     KHh;
      ==    K0;
      SP    =LAB;
      L     EBe.b;
      TBB   M4.1;
      DBB   ANZ 8;
      U     M4.m;
      =     Ax.y;
      =     Ax.y;
      U     M4.m;
      =     Ax.y;
```

```
        =       Ax.y;
        L       Kt;
        =       TSW1;
LAB:    ***;
```

The corresponding macro is read in during generation of the IL depending on the command type (1-pole or 2-pole) and the module type.

The constants for coding the command are included in the macros for 1-pole command output. Variables x.y are simply replaced with the output addresses, variables e.b with the input bytes of the KOS and variable t with the command output time.

For 2-pole command output to 4-output modules (DAP 204 and DAP 212), variable h is also replaced with the constant for coding the commands. Variable m is furthermore replaced with the marker which should approach the command output.

6.3.17 Program Block PB17

```
:A      IB 2.3      The input bytes of the
:=      MB 43       1st KOS are loaded into
:A      IB 2.4      marker bytes 43 to 168
:=      MB44
.       .
.       .
:A      IB 2.127
:=      MB 167
:A      IB 2.128
:=      MB 168
:***
:BE
```

6.3.18 Program Block PB18

```
:A    IB 3.3      The input bytes of the
:=    MB 43       2nd KOS are loaded into
:A    IB 3.4      marker bytes 43 to 168
:=    MB 44
.     .
.     .
:A    IB 3.127
:=    MB 167
:A    IB 3.128
:=    MB 168
:***
:BE
```

6.3.19 Program Block PB19

```
:A    QB  2.1     The output bytes of the
:=    QB  3.1     1st KOS are copied into
:A    QB  2.2     the output byte of the
:=    QB  3.2     2nd KOS
.     .
.     .
:A    QB  2.127
:=    QB  3.127
:A    QB  2.128
:=    QB  3.128
:***  :BE
```

6.3.20 Program Block PB21

```
Measure minimum and maximum extreme values in 10-minute interval
01          :BC       FB 6        Call extreme value processing
02 NAME     :EXTREM
03 MESS     :         QB 2.5      Obtain measurand from transfer byte
04 CNT1     :         CNT 2
05 MIN      :         QB 2.27     Transfer byte for minimum value
06 CNT2     :         CNT 2
07 MAX      :         QB 2.29     Transfer byte for maximum value
08 CNT3     :         CNT 2
09          :***
10          :LD       IB 128      Transfer byte for seconds
11          :==       VH1         If the seconds are not 1
12          :=        M 4.1       end of block
13          :BEZ
14          :LD       IB 126      Transfer byte for minutes
15          :DIV      VH10        Divide minutes by 10
16          :=        MB 1
17          :A        SMB1        If the remainder of division is 0
18          :==       V 0         the interval has elapsed.
19          :BCC      PB 22       Call extreme value standardization
            :***
            :BE
```

Macro file EXTREM_1.MAC

```
* Measure minimum and maximum extreme values
BA FB6(
AB a.b,
ANZ 2,
AB a.b,
ANZ 2,
AB a.b,
ANZ 2);
***;
```

Lines 1 to 8 are generated depending on the measurand for which extreme values are to be computed.

The computed (ADU 204/205) or limited measurand is transferred in line 3. The 2 output bytes for minimum and maximum value are transferred in the subsequent lines up to and including 8.

In lines 10 to 13 there is a check whether the 1st second of a minute is reached. If this is not the case, the block is aborted.

In lines 14 to 19, the minutes are divided by the parametrized time interval. If the remainder of the division is 0, the time interval must have been reached and the standardization of the extreme value is called.

☞ **Note** The time is transferred from the KOS to the IL in IBs 121 to 128. This time is used to compute the time interval in the IL. This ensures that the extreme value standardization and the ring buffer entry are carried o ut synchronously in the KOS.

Measure minimum values in 2-hour interval

```
01          :BA FB 6
02 NAME     :EXTREM
03 MESS     :           QB 2.5
04 CNT1     :           CNT 2
05 MIN      :           QB 2.27
06 CNT2     :           CNT 2
07 MAX      :           MB 3          Two auxiliary bytes are
08 CNT3     :           CNT 2         transferred for the maximum value
09          :***
10          :LD         IB 1.128      Check seconds
11          :==         VH 1
12          :=          M 4.1
13          :BEZ
14          :LD         IB 1.126      Check minutes
15          :==         VH 0
16          :=          M 4.1
17          :BEZ
18          :LD         IB 1.125      Check hours
19          :DIV        VH 2
20          :=          MB 1
21          :A          SMB 1
```

```
22          :==         V 0
23          :BCC        PB 22
24          :***
:BE
```

Both extreme values are always computeed in the FB. If only one extreme value is required, two auxiliary bytes and no KOS output byte are transferred for the others. If only maximum values are computed, both auxiliary bytes are transferred in line 5 and the output byte for the maximum value is entered in line 7. In this way it is possible to manage with only one function block.

6.3.21 Program Block PB22

```
01      :LBW    QB 2.5      Store current measurand in ABs
02      :DBB    CNT 2
03      :TBW    QB 2.27     for minimum value
04      :DBB    CNT 2
05      :TBW    AB 2.29     and maximum value
06      :DBB    CNT 2
        :***
        :BE
```

or

```
01      :LBW    QB 2.5      Store measurand only in ABs
02      :DBB    CNT 2
03      :TBW    QB 2.27     for minimum vlaue
04      :DBB    CNT 2
05      :TBW    MB 3
06      :DBB    CNT 2
        :***
        :BE
```

or

```
01      :LBW    QB 2.5      Store measurand only in ABs
02      :DBB    CNT 2
03      :TBW    MB 3
04      :DBB    CNT 2
```

```
05    :TBW    QB 2.27          for maximum value
06    :DBB    CNT 2
      :***
      :BE
```

```
* Standardization of extreme values after expiration of the time interval
LBW   a.b;
DBB   CNT 2;
TBW   a.b;
DBB   CNT 2;
TBW   a.b;
DBB   CNT 2;
***;
```

In this way it is possible to manage with only one macro for standardizing the extreme values.

6.4 The Funciton Blocks

The function blocks all reside in the macro file FBS.MAC. They do not contain any variables which the generator must replace.

All the function blocks are written into the file USTx.AWL, whether or not they are required. This does not result in an unnecessarily large instruction list because only those blocks which are also called in the IL are linked during PLC linkage under Dolog AKF → A120.

6.4.1 Funktion Block FB1

```
NAME  : DOPPELM
BEZ   : IN     B8 L
BEZ   : ANZ    ANZ L
BEZ   : DMNR   MB R
BEZ   : DMMB   MB R
      : ***
      : LBB    =IN       Load double-point information as byte
      : DBB    =CNT
      : TBB    M4.1      and reload to 8 marker bit
      : DBB    ANZ 8
      : LD     =DMMB     Check 1st double point information
      : ADD    KH1       For 1st double-point information,
                         add constant 1 to DMMB
      : =      MB5       Store result in MB5
      : A      M4.1      Check 1st and 2nd DM-inputs for
      : X      M4.2      inequality
      : SP     =ME11     If no malposition, skip to label ME11
      : A      =DMNR     If both equal, check if malposition
      : A      VH1       was already recognized
      : ==     VH1       1st bit set = malposition recognized
      : SP     =MEL2     Skip to 2nd malposition check
      : A      VH1
      : =      M1.9      Set input malpositon timer
      : A      =DMNR
      : O      VH1       Set malposition in DMNR as recognized
      : =      =DMNR
```

```
        : LD    MB5     Enter malposition code in marker word
        : =     MB6     for last malposition occurred
        : SP    =ENDE   Skip to block end
ME11    : A     =DMNR
        : A     VH1     Was this malposition set in
        : ==    VH1     last IL scan
        : JF    =MEL2   If no, check 2nd malposition
        : A     =DMNR   If yes, delete malposition bit from DMNR löschen
        : A     KHFE
        : =     =DMNR
        : LD    MB5     Was this last malposition
        : ==    MB 6    to occur
        : JF    =MEL2   If no, check 2nd malposition
        : A     VH1     If yes, set marker for
        : =     M1.10   malposition timer reset
        : A     V0      Delete marker byte for last malposition
        : =     MB6
MEL2    : LD    =DMMB   Check 2nd double-point information
        : ADD   VH2     Add constant 2 to DMMB for
        : =     MB5     2nd double-point information and store in MB5
        : A     M4.3    Check input 3 and 4 for inequality
        : X     M4.4
        : SP    =ME22   Further processing and check
        : A     =DMNR   in same manner as for
        : A     VH2     1st double-point information
        : ==    VH2
        : SP    =MEL3
        : A     VH1
        : =     M1.9
        : A     =DMNR
        : O     VH2
        : =     =DMNR
        : LD    MB5
        : =     MB6
        : SP    =ENDE
ME22    : A     =DMNR
        : A     VH2
        : ==    VH2
        : JF    =MEL3
        : A     =DMNR
        : A     KHFD
```

```
      : =     =DMNR
      : LD      MB5
      : ==    MB6
      : JF    =MEL3
      : A     VH1
      : =     M1.10
      : A     VH0
      : =     MB6
MEL3  : LD    =DMMB     Check 3rd double-point information
      : ADD   VH3       Add constant 3 to DMMB for
      : =     MB5       3rd double-point information and store result
                        in MB5
      : A     M4.5      Check input 5 and 6 for inequality
      : X     M4.6
      : SP    =ME33     Further processing and check
      : A     =DMNR     in the same manner as for
      : A     VH4       1st double-point information
      : ==    VH4
      : SP    =MEL4
      : A     VH1
      : =     M1.9
      : A     =DMNR
      : O     VH4
      : =     =DMNR
      : LD    MB5
      : =     MB6
      : SP    =ENDE
ME33  : A     =DMNR
      : A     VH4
      : ==    VH 4
      : JF    =MEL4
      : A     =DMNR
      : A     VHFB
      : =     =DMNR
      : LD    MB5
      : ==    MB6
      : JF    =MEL4
      : A     VH1
      : =     M1.10
      : LD    VHZ0
      : =     MB 6
```

```
MEL4  : LD   =DMMB   Check 4th double-point information
      : ADD  VH4     Add constant 4 to DMMB for
      : =    MB5     4th double-point information and store
                     result in MB5
      : A    M4.7    Check input 7 and 8 for inequality
      : X    M4.8
      : SP   =ME44   Further processing and check
      : A    =DMNR   in the same manner as for
      : A    VH8     1st double-point information
      : ==   VH 8
      : SP   =ENDE
      : A    VH1
      : =    M1.9
      : A    =DMNR
      : O    VH8
      : =    =DMNR
      : D     MB5
      : =    MB6
      : SP   =ENDE
ME44  : A    =DMNR
      : A    VH8
      : ==   VH8
      : JF   =ENDE
      : A    =DMNR
      : A    VHF7
      : =    =DMNR
      : LD   MB5
      : ==   MB6
      : JF   =ENDE
      : A    VH1
      : =    M1.10
      : A    VH0
      : =    MB6
ENDE  : BE
```

6.4.2 Function Block FB2

```
NAME   : DM-UMSP
BEZ    : IN      B8 L
BEZ    : ANZ     ANZ L
BEZ    : OUT     QB R
BEZ :    MERK    MB R
       : ***
       : A       VH 0        The double-information marker byte is transferred
in MERK
       : =       =MERK       and set to NULL (zero)
       : LBB     =IN         Load double-point information inputs
       : DBB     =CNT
       : =       =OUT        and reload in KOS output byte
       : BE
```

6.4.3 Function Block FB3

```
NAME:  ZAEHLWER
BEZ :  EIN       I L
BEZ :  FLK       M R
BEZ :  OUT       B2 R
BEZ :  ANZ       ANZ R
       : ***
       : A       =EIN        If pulse input is 1
       : AN      =FLK        and was 0 in last scan,
       : JF      =ENDE
       : LBW     =OUT        load the two KOS output bytes of the measurand
       : DBB     =CNT        and increment them by 1
       : INC
       : TBW     =OUT        Store result in the 2 bytes again
       : DBB     =CNT
ENDE   : A       =EIN        Store state of pulse input
       : =       =FLK        in edge detector marker
       : BE
```

6.4.4 Function Block FB4

```
NAME:  205/8BoV
BEZ :  EIN      IW L
BEZ :  OUT      QB R
       : ***
       : LD     =EIN      Load measurand input
       : =C     MW1       and write to marker word MW1
       : <      V0        If measurand less than NULL (zero)
       : SP     =NEG      skip to processing of negative MW
       : LD     MW1       Load measurand and check for
       : >      V16382    overflow
       : JF     =LAB1     If no overflow, convert measurand
       : LD     V16382    Limit measurand to maximum
       : =      MW1
LAB1   : A      MW1
       : SHR    V6
       : =C     MW2       Corresp. measurand/64
       : SHR    V1        Corresp. measurand/128
       : ADD    MW2
       : =      MW2       Measurand/64 + Measurand/128
       : LD     MW1
       : SUB    MW2
       : =      MW2       Measurand - (Measurand/64 + Measurand/128)
       : A      MW2
       : SHL    V1        Computed measurand x 2 (left-justified)
       : TBW    M4.1      Reload converted measurand
       : DBB    ANZ 16    to bit string
       : SP     =UMSP
NEG    : A      V0        If negative measurand,
       : TBW    M4.1      set bit string to NULL (zero)
       : DBB    ANZ 16
UMSP   : LBB    M4.8      Write markers 4.8 to 4.16 as 8-bit measurand
       : DBB    ANZ 8
       : =      =OUT      to KOS output byte
       : BE
```

6.4.5 Function Block FB5

```
NAME  : ADU205
BEZ   : EIN   IW L,
BEZ   : OUT   B2 R,
BEZ   : ANZ   ANZ R
      : ***
      : LD    =EIN      Load measurand input
      : =C    MW1       and write to marker word MW1
      : <     V0        If measurand less than NULL (zero)
      : JT    =NEG      skip to processing of negative MW
      : LD    MW1       Load measurand and check
      : >     V16382    for overflow
      : JF    =LAB1     If no overflow, convert measurand
      : LD    V 16382   Limit measurand to maximum
      : =     MW1
LAB1  : A     MW1
      : SHR   V6
      : =C    MW2       Corresp. measurand/64
      : SHR   V1        Corresp. measurand/128
      : ADD   MW2
      : =     MW2       Measurand/64 + Measurand/128
      : LD    MW1
      : SUB   MW2
      : =     MW2       Measurand - (Measurand/64 + Measurand/128)
      : A     MW2
      : SHL   V1        Converted measurand x 2 (left-justified)
      : TBW   =OUT      Reload converted measurand
      : DBB   =CNT      to two KOS output bytes
      : JT    =ENDE
NEG   : LD    MW1       Load measurand and
      : >     V-16386   check for overflow
      : JF    =LAB2     If no overflow, convert measurand
      : LD    V-16386   Limit measurand to minimum
      : =     MW1
LAB2  : A     MW1       Load negative measurand
      : A     VH7FFF    Mask out sign bit and
      : =C    MW3       store in marker word MW3
      : SHR   V6
      : =C    MW2       Corresp. measurand/64
```

```
        : SHR   V1      Corresp. measurand/128
        : ADD   MW2
        : =     MW2     Measurand/64 + Measurand/128
        : LD    MW3
        : SUB   MW2
        : =     MW2     Measurand - (Measurand/64 + Measurand/128)
        : A     MW2
        : SHL   V1      Converted measurand x 2 (left-justified)
        : =     MW2
        : LD    V0      Negate converted measurand
        : SUB   MW2     again and
        : TBW   =OUT    reload to two KOS
        : DBB   =CNT    output bytes
ENDE    : BE
```

6.4.6 Function Block FB6

```
NAME    :EXTREM
BEZ     :MESS   B2 L
BEZ     :CNT1   CNT L
BEZ     :MIN    B2 R
BEZ     :CNT2   CNT R
BEZ     :MAX    B2 R
BEZ     :CNT3   CNT R
        :***
        :LBW    =MESS   Load the 2 ABs of the measurand
        :DBB    =CNT1   and store in the marker word
        :=      MW 1
        :LBW    =MIN    Load the 2 ABs of the minimum value
        :DBB    =CNT2   and store in the marker word
        :=      MW 2
        :LBW    =MAX    Load the 2 ABs of the maximum value
        :DBB    =CNT3   and store in the marker word
        :=      MW 3
        :LD       MW 1  Is marker word smaller than minimum value?
        :<      MW 2
        :JF     =LABEL  If no, jump to maximum value comparison
        :L      MW 1    If yes, store measurand as
        :TBW    =MIN    minimum value
```

```
        :DBB    =CNT2
LABEL   :LD       MW 1      Is measurand greater than maximum value?
        :>      MW 3
        :JF     =ENDE       If no, jump to end of network
        :LD       MW 1      If yes, store measurand
        :TBW    =MAX        as maximum value
        :DBB    =CNT3
ENDE    :***
        :BE
```

6.4.7 Function Block FB7

```
NAME  : UP1AUSN
BEZ   : INPU   IB L
BEZ:    OUTP   MB R
      : ***
      : LD     VH1        Set 1st bit in marker
      : =      MB4        byte MB4
      : A      =INPU      Compare transferred command
      : A      MB4        byte with UND operation
      : ==     KH0
      : JF     =LAB2      If agreement, skip to label LAB2
LAB1  : A      MB4        Check if last bit in marker byte
      : ==     KH80       is already set
      : JT     =LAB3      If yes, skip to end of block
      : A      MB4        If no, set next bit
      : SHL    VH1        in MB4
      : =      MB4
      : A      =INPU      Compare MB4 and transferred
      : A      MB4        command byte with UND operation
      : ==     KH0        If no agreement, skip to
      : JT     =LAB1      Label LAB1 and check next bit
LAB2  : LD     =OUTP      Load error counter byte laden and
      : ADD    VH1        increment by 1
      : =      =OUTP
      : SP     =LAB1
LAB3  : BE
```

6.4.8 Function Block FB 8

```
NAME  : DAUEBE
BEZ   : INPU   IB L
BEZ   : MERK   M L
BEZ   : AUS    B8 L
BEZ   : ANZ    ANZ L
      : ***
      : LBB    =AUS      Load command outputs
      : DBB    =CNT
      : =      MB1       and store in marker byte MB1
      : A      =MERK
      : SP     =LAB1
      : LD     MB1       If MERK = 0, shift lower 4 bits
      : MUL    VH10      by 4 positions to the left
      : =      MB1       (Command in upper 4 bits of the KOS-IB's)
LAB1  : LD     MB1
      : ==     VH0       If no command output set,
      : SP     =ENDE     skip to end of block
      : LD     MB1       If command output not equal
      : ==     INPU      to new command from KOS,
      : JF     =ENDE     skip to end of block
      : A      VH1       If equal, start timer
      : =      M1.4      for command output time again
ENDE  : BE
```

6.4.9 Function Block FB10

```
NAME   : P-ABEF
BEZ    : AUSG   B8 L
BEZ    : ANZ1   ANZ L
BEZ    : EING   B8 L
BEZ    : ANZ2   ANZ L
       : ***
       : LBB    =AUSG     Load command outputs
       : DBB    =CNT1
       : =      MB4       and store in marker byte MB4
       : LBB    =EING     Load monitored information inputs
       : DBB    =CNT2
       : =      MB5       and store in marker byte MB5
       : A      MB4       Compare marker byte MB4 and marker byte
MB5
       : A      MB5       with UND operation
       : <      V0        If comparison positive
       : O      M1.7      or input marker timer link time
       : =      M1.7      already set, input marker
       : BE               is set to 1
```

6.4.10 Function Block FB11

```
NAME   : GRW
BEZ    : KENN   M L
BEZ    : EING   B2 L
BEZ    : ANZ    ANZ L
BEZ    : GREN   MW L
BEZ    : HYST   MW L
BEZ    : MELD   QB R
BEZ    : BIT    MB R
       : ***
       : LBW    =EING     Store transferred measurand
       : DBB    =CNT      in marker word MW1
       : =      MW1
       : A      =KENN     If KENN = 0, skip to lower
       : JF     =U-GR     limit monitoring
       : A      MW1       Compare measurand and limit
```

```
        : >=    =GREN   If limit exceeded
        : JF    =LAB1
        : A     =MELD   load information byte and
        : O     =BIT    set information bit for
        : =     =MELD   limit violated
        : SP    =ENDE   Skip to end of block
LAB1    : A     MW1     Check if measurand reached the threshold
        : <=    =HYST   limit minus hysterese
        : JF    =ENDE   If no, skip to end of block
        : A     =BIT    If yes, load information bit of limit
        : X     VH FF   and invert
        : =     =BIT
        : A     =MELD
        : A     =BIT    Reset information bit for this
        : =     =MELD   limit violation
        : SP    =ENDE   Skip to end of block
U-GR    : A     MW1     Compare measurand and limit
        : <=    =GREN   If limit underflow
        : JF    =LAB2
        : A     =MELD   load information byte and
        : O     =BIT    set information bit for
        : =     =MELD   limit underflow
        : SP    =ENDE   Skip to end of block
LAB2    : A     MW1     Check if measurand reached the threshold
        : >=    =HYST   limit minus hysterese
        : JF    =ENDE   If no, skip to end of block
        : A     =BIT    If yes, load information bit of limit
        : X     VH FF   and invert
        : =     =BIT
        : A     =MELD
        : A     =BIT    Reset information bit for this
        : =     =MELD   limit overflow
ENDE    : BE
```

6.4.11 Function Block FB12

```
NAME    :206/8BoV
BEZ     :EIN IW L
BEZ     :OUT QB R
        :***
        :LD         =EIN      Load measurand
        :=C         MW 1
        :<          V 0       Is measurand negative,
        :JT         =NEG      Jump to negative value processing
        :LD         MW 1
        :>          V 32000   Check if measurand has overrange
        :JF         =UMSP     If no, jump to relocate
        :LD         V 32000   If yes, limit measurand to maximum
        :=          MW 1
        :JI         =UMSP
NEG :A  V 0                   If measurand is negative
        :=          MW 1      set to zero
UMSP    :LD         MW 1      Reload measurand in bit string
        :TBW        M 4.1
        :DBB        ANZ 16
        :LBB        M 4.8     Load one byte with offset from
        :DBB        ANZ 8     bit string and relocate as 8-bit
        :=          =OUT      measurand in KOS output byte
        :***
        :BE
```

6.4.12 Function Block FB13

```
NAME    :ADU206
BEZ     :EIN   IW          L
BEZ     :OUT   B2          R
BEZ     :CNT   CNT         R
        :***
        :L     =EIN        Load measurand
        :=C    MW 1
        :<     V 0         If measurand is negative,
        :JT    =NEG        Call negative value processing
        :LD    MW 1
        :>     V 32000     Check pos. measurand for overrange
        :JF    =UMSP       If no overrange, relocate measurand
        :LD    V 32000     If overrange, limit measurand
        :=     MW 1        to maximum value
        :JI    =UMSP
NEG     :LD    MW 1
        :<     V -32000    Check neg. measurand for overrange
        :JF    =UMSP       If no overrange, relocate measurand
        :LD    V -32000    If overrange, limit measurand
        :=     MW 1        to minimum value
UMSP    :LD    MW 1
        :TBW   =OUT        Relocate measurand to
        :DBB   =CNT        KOS output bytes :B
```

Part IV
KOS 201 - Parameter assignment

The parameter assignment of the KOS 201 with the configuration aid PRO → U120 or with KOS 201 P ist described in this part.

Chapter 1
General Information

There are two ways to input parameters for the KOS 201.

- Input of the KOS 201 data model by the user in the corresponding menues.
- Transfer of the data model generated in PRO → U120 to the KOS 201 parameters.

If you want to use the KOS parametering program without PRO → U120, it can be started directly from the operating system level with the call C:\PRO-U120\KOS201P.

If the data model is generated by PRO → U120 and transferred when the KOS parametering is called, the tables “data for control direction” and “data for monitoring direction” as well as the general parameters are already filled in. The KOS and SEAB parameters are set to the initial values (see Chap. 2.7). The setpoint values are initialized to 0 and the pulse thresholds for measurands to 255. For monitored information and measurands, the code A for “set transfer bit” is already entered. The edge detection for real-time information is set so that both edges are transferred as result. You can change these default values or make further specifications regarding ring buffer handling if required.

Of course you can also change the default values of PRO → U120 for the KOS parametering.

Note Keep in mind that changes in the data field for control and monitoring direction (QBx.1 ... QBx.128, IBx.1 ... IBx.128) must also be taken into consideration in the instruction list.

No other changes have any effect on the instruction list. The changed parameters are stored in the file Uxxx-yyy.KOS.

xxx = UST-No.
yyy = Line number or slot reference if KOS 201 P is started directly.

Before the KOS main menu appears, there is a query whether the KOS parameters should be newly created or whether the old data should be maintained. If the KOS file is newly created, the standard values for the transfer bit, ring buffer entry, edge detection code etc. are set. If you made no changes to the data points, you can call the KOS parametering without generating a new file. The settings you made in a previous call are not changed by this.

Chapter 2
Handling

2.1 Main Menu E5 B1

The main menu appears after the KOS parametering has been called. You can change the individual submenues with the function keys <F1> - <F6>.

- ❒ <F1> Configure parameter lists
- ❒ <F2> Data Archive
- ❒ <F3> Transfer
- ❒ <F4> Printer Output
- ❒ <F5> EPROM Menu
- ❒ <F6> Reset of PADT Memory
- ❒ <F7> Bottom-up configuration export
- ❒ <F8> Switch Monochrom / Color
- ❒ <F9> Return to DOS or PRO → U120 main program

2.2 Process parameter list E6 B1

A menu appears from which you can branch to the particular submenues.

2.2.1 General Parameters E7 B1

”Process parameter lists”,”General parameters” (F1 → F1)

The current date is displayed if this outstation is processed for the first time. The last date of processing is displayed if an existing parameterdefinition was read in from diskette, hard disk, EPROM or KOS-RAM.

System A maximum of 8 characters may be entered. Only characters which are valid for file names under DOS are permitted because the system name is the name of the subindex under which the data of the individual stations is archived. For this reason input is absolutely necessary. Otherwise the requirements of the line editor are valid. If a system was terminated or confirmed with, it is displayed in each menu to the upper right.

Comments Operator Outstation
A maximum of 16 characters can be input, but input is not compulsory. The requirements of the line editor are valid.

Type of communication

The type of communication displayed in the inverse field can be toggled with <Cr>.
The standard setting is SEAB-1F.

Further settings: SEAB-1F without M5
APS (automatic polling service)

Outstation number A number between 0 and 126 may be input.

KOS address The slot in the basic subrack (1 ... 3) in which the KOS is inserted is entered.

☞ **Note** If the KOS parameter assignment is called by PRO-U120, the entries transferred for system, comment, programmer and outstation cannot be edited.

2.2.2 SEAB parameter E7 B2

”Configure parameter lists”,”SEAB parameter”
(F1 → F2)

First the baud rate is interrogated. The standard setting is 600 baud. Another baud rate can be selected by toggling with <Cr>. (50, 100, 200, 300, 600, 1200, 2400, 4800, 9600)

The subsequent times are entered in tbits. Values between 1 and 255 or 60 and 65635 are possible. For the standard setting see Chap. 2.7.

If the KOS is driven together with a UEM 001, the following times are valid:

Table 3 Time Parametering U120 in Different Configurations

	600 Baud	1 200 Baud
S2 Lead time	15 T	30 T
S2 Trailer tim	4 T	4 T
S2 Pause time	16 T	26 T
Quit LT	60 T	84 T
M5 Lead time	20 T	35 T
M5 Trailer time	20 T	30 T

Caution If the standard values are to be changed, data loss can occur if the parameters are not suitable for the system.

2.2.3 KOS Parameters for SEAB-1F E7 B3

”Configure parameter lists”,”KOS parameters” (F1 → F3)

- The deviation time integral (AZI) for 8-bit measurands and 11-bit measurands (in the range from 1 - 16000) is specified. The standard setting is 5000.

- There is a query after how many event entries a buffer overflow warning should be output. A maximum of 4095/8192 events can be entered in the ring buffer. Standard setting = 3072.

The quantity of the ring buffer depends on the firmware version and the hardware.

FWM 001	(275 125)	KOS 201/202	4K RB
FWM 002	(275 126)	KOS 201/202	4K RB
FWM 007	(261 541)	KOS 202	8K RB
FWM 008	(261 542)	KOS 202	8K RB

Standard setting is 3072 in relation to the 4k RB version.

- One can specify whether reading the ring buffer should be activated after short polling (KA) or only after general polling (GA). Standard setting = KA. Setting with the keys <J> and <N> or by toggling.

- One can choose between two analog value scalings. A range from 0 - 2047 is set standardly but can be switched to 0 - 2000. This scaling factor is valid for the analog setpoint values and the 11-bit measurands. The 8-bit measurands are scaled accordingly from 0 - 255 or from 0 - 250. Set by toggling.

- Some master stations (e.g. A350) cannot process 4D-telegrams. One can switch to pure 2D-telegram operation for these master stations.

☞ **Note** There can be no ring buffer processing if there was a switch to pure 2D-telegrams. The system information is sent in a special format (see user manual U120). For this reason the module failure information cannot be transferred n of 18 as system information (subaddr. 1 and 2). It should be reparametrized into monitored information if a transfer is necessary.

- There is a query whether a DCF-receiver should be connected. This is set with the keys <J> and <N> or by toggling.

- The starting behavior of the KOS after a power failure is set. One can toggle between “cold restart” and “hot restart”. A cold restart means that the ring buffer RAM is normed when the power returns. In a hot restart, the battery-buffered ring buffer data is transferred to the master station.

- There is a query whether the KOS should transfer the time of day to the PLC (see also Chap. 2.2.4 “Data for Control Direction”)

- Suppress meassage ”Missing Minute Pulse”

The meassage ”Missing Minute Pulse” is send once 10 minutes after the last valid minute puls via DCF 77E. Every valid time meassage resets the ”error counter” of the KOS firmware, so that at least 10 wrong or missing time meassages in succession release the transfer of the corresponding meassage. The transfer of the meassage can be suppressed by parameterization.

- Definition of running reserve

If the synchronization of the internal clock is not possible because there is no valid minute pulse from DCF 77E or time meassage from the master station, a corresponding meassage is send to the master station after a parameterizable time. After this time the internal clock is stopped an realtime informations are written to the ring buffer with the fine time FFFFH. Other data are written to the ring buffer not any more.

Values of 1, 26 and 50 hours are possible.

☞ **Note** If you use synchronization via DCF 77E and a running reserve of 26 hours, it may occur that the internal clock can be no longer synchronized, if the DCF-signal has failed for more than 10 hours. Synchronization is only possible after the 26 hours have elapsed. The selection of a running reserve of 50 hours is not allowed with DCF 77E.

2.2.4 Assignment Lists for SEAB-1F E7 B4

”Configure parameter lists”,”Assignment list”
(F1 → F4)

A menu appears from which you can call the individual submenues.

The inversely displayed fields always show which specifications are active.

☞ **Note** 2 bytes of the KOS interface are always defined simultaneously due to the 16-bit homogenity of the SEAB-1F-telegrams. For this reason the term word or data word was used in the subsequent text.

You can select the data word in the table which you want to define with <←> , <→> , <Tab> or <Shift>+<Tab> in all the submenues. In order to redefine a word, you must only select the corresponding word, set the new data and enter.

The KOS interface is 128 bytes or 64 words large in both directions. Since not all the data words can be displayed on the screen at one time, one can page between two pages with <PgUp> and <PgDn>.

Data for monitoring direction **E8 B1**

”Configure parameter lists”, ‘‘Assignment lists”,”Data for monitoring direction”
(F1 → F4 → F1)

The data type can be changed with <←> and <→>. Group numbers (A1-byte) are entered with the digit keys.

One can specify for each data type whether a transfer bit <A> should be set if it is changed. Furthermore, cyclic ring buffer entries <Z> can be made. All data except for monitored information can also be entered in the ring buffer as an event <E>. Monitored information for which each event is to be entered in the ring buffer must be parametered as real-time information.

The following are defined as events:

- Changes in monitored information
- Reaching the pulse threshold for counted measurands
- Reaching the AZI for measurands

You can configure for all types of data whether they should be transferred if there is a general interrogation <G>. This is also valid for the processs state of the real–time signals. Real-time information is always entered in the ring buffer as an event. For this reason the query ‘‘event in ring buffer” can be omitted here.

You can define whether a transfer bit <U> should be set for relocated counted measurands.

One can switch between yes and no in the individual queries by pressing the keys <A>, <G>, <U>, <E> or <Z>.

For each allocation with there is an automatic check whether the selected group number is still available and whether the maximum value for the individual data types is not exceeded. If this is the case, the corresponding remark appears on the screen.

The following data types are processed:

❒	64	Measurands 8-bit	(max. 32 words)
❒	63	Measurands 11-bit	(max. 63 words)
❒	63	Counted measurand	(max. 63 words)
❒	256	Monitored information	(max. 16 words)
❒	256	Transient information	(max. 16 words)
❒	256	Real-time information	(max. 16 words)
❒	48	System information	(max. 3 words)

A total of only 64 words can be transmitted.

These limits are partly defined by the capacity of the KOS interface and partly by the hardware requirements.

Caution The acquisition time of transient information depends on the IL cycle time. The average cycle time is 20 ms.

The exact cycle time of an outstation can be scanned online with the KOS (see Chap 2.4).
Only the rising edges are acquired.

Data for control direction **E8 B2**

”Process parameter lists”,”Assignment lists”,”Data for control direction”
(F1 → F4 → F2)

The data type and group number are selected and entered exactly as for data for monitoring direction.

The following data types are processed:

- ❒ 256 Single commands (max. 16 words)
- ❒ 16 Digital setpoint values (max. 16 words)
- ❒ 32 Analog setpoint values (max. 32 words)
- ❒ 16 Organization commands (max. 1 word)

A total of only 64 words can be transmitted.

If the KOS clock time is transmitted to the PLC, this is done with the last 4 words or 8 bytes.

EBx.121 Year

EBx.122 Month

EBx.123 Weekday

EBx.124 Day

EBx.125 Hour

EBx.126 Minute

EBx.127 Special character

EBx.128 Second

The entry is in BCD code.

If the clock time in the KOS was set by a clock message by the master station, bytes 123 and 127 are set to 0 since the message does not contain any information for them.

If the time in the KOS is set by the DCF receiver, these bytes are defined as follows:

Byte 123 → 1 = Monday
2 = Tuesday
etc.

Definition of the special characters for byte 127:

1st bit	Switch to reserve antenna
2nd bit	Notification of ST/WT switchover; is set 1 hour before switchover
3rd bit	Summer time
4th bit	Winter time
5th bit	Switchover second
6th bit	Start bit for time information

Setpoint default value **E8 B3**

”Configure parameter lists”,”Assignment lists”,”Setpoint default value”
(F1 → F4 → F3)

If setpoint values were entered in the menu for control direction, these are also set in the menu for setpoint values. You can assign the relevant data words a value between -32767 and +32767. The value parametered here is output by the KOS after a power failure until a new setpoint value has arrived from the master station. Basic setting = 0.

Counter measurand processing E8 B4

”Configure parameter lists”,”Assignment lists”,”Counter measurand processing”
(F1 → F4 → F4)

If counter measurands were entered in the menu for monitoring direction, these are also set in the menu for counter measurand processing. If you want to define pulse thresholds for the individual counter measurands, enter a decimal number between 0 and 255. The input must be terminated with. Basic setting= 0.

❒ Example:
In the menu ‘‘Data for monitoring direction”, ‘‘set transfer bit” was set for a counter measurand. The pulse threshold was set to 100. The counter measurand is always transmitted after a short call if the difference between the last transmitted counter measurand and the current counter measurand is 100 counting pulses.

Ring buffer handling E8 B5

”Configure parameter lists”,”Assignment list”,”Ring buffer handling”
(F1 → F4 → F5)

If it was defined in the menu for monitoring direction that data should be written into the ring buffer cyclically, you can define in this menu when this entry should occur. Times of 1, 5, 10, 15, 20, 30 minutes and 1, 2, 4, 8, 12, 24 hours can be selected as reload periods. The selection is made by toggling.

”Configure parameter lists”,”Assignment lists”,”Edge detection real-time information”
(F1 → F4 → F6)

If real-time information was parametered in the menu for monitoring direction, you can specify in this menu whether the rising edge, falling edge or both edges should be transmitted as event. Basic setting = both edges.

The 16 real-time information bits of a SEAB-1F-telegram are always represented in the form of ‘‘mouse pianos”. The falling edge is interrogated in the upper and the rising edge in the lower. One can change between rising and falling edge with <F> and <S>.

The switch for the set bit can be switched between yes and no with <Cr>.

The individual bits are selected with <←> and <→>.

The group number is incremented or decremented with <↑> and <↓>. The individual real-time information words are set in this way. The first byte of the set real-time information word in the KOS data field is also displayed.

2.2.5 APS Parameter E7 B5

”Configure Parameter Lists”, “Automatic Polling Service (APS)”
(F1 → F5)

This menu can only be selected if APS was set as the type of communications in the menu “General Parameters”.

If the communications with the master station (currently only Z300M) is to use the public network, the KOS must be equipped with the AWD 001 interface module. A postal modem (MDB 1200) is also required for connection to the network.

All the necessary parameters for the outstation and the master station are interrogated in this menu. The connection can be made with four lines, whereby there can be one master station with four lines or four different master stations. The outstation itself, however, can only introduce a connection with lines 1 and 2. The master stations can only set up the connection with lines 3 and 4. Of course it is also possible to work with only one line.

A file containing the calling number of the outstation and the parameters for the master station may be specified for each of these lines. The master stations can use these files for their own parameter assignment. If several outstations are operating on the same line, the same file name must be entered each time. This ensures that the calling number of the individual outstations are collected in a master station file. If the cursor is faded into a file input field, existing file names can be selected from a window with <F1>.

When an existing file is read, there is a plausibility check of the paramters entered in the menu and the file contents. If these do not correspond, the appropriate remark appears on the screen and you can decide which data are valid.

There are rules governing the file names for a Z300M since these depend on the slot of the PC-AWD.

Slot 1 → LINIE_1 and LINIE_2
Slot 2 → LINIE_3 and LINIE_4
Slot 3 → LINIE_5 and LINIE_6
etc.

The Z300M reads the AWD files from diskette with a load function. This assumes that the file are available on one diskette for each master station. The user must carry out the copy process required here himself in the DOS level.

Example:

```
COPY C:\ANLAGE.PRO\FW\LINIE_1.AWD A:\
```

(see also Chapter 3.3, Part III)

Handling:
First press <Cr> to activate the line editor for the input fields. The input is also terminated with <Cr>. The input and toggle fields are selected with the cursor keys. The file selection window is called with <F1> when the cursor is in the file field of the master stations. You can switch between master stations 1/2 and 3/4 with <F2>.

Password:
The password comprises max. 15 characters (letters, digits or special charcters). The slash '/' is not permitted. Capital letters are distinguished from small letters. The password is valid for the outstation and the master station.

Calling number:
The calling number of the outstations and the master station has a maximum of 15 digits. The area code and calling number are entered without a gap. A calling number for the second master station is not required. However, at least one of the master stations 1 or 2 must be configured.

Dial Mode:
You can choose pulse selection or tone selection by toggling.

Connection Mode:
6 different types of connection can be selected:
- Main connection
- Extension T1 → without exchange call
- Extension T2 → exchange call with 0
- Extension T3 → exchange call with 0 + wait
- Extension T4 → exchange call with groundkey
- Extension T5 → exchange call with groundkey + wait

Extension T1 is only possible if the master station and the outstation are connected to the same extension network. For extensions T3 and T5, the postal modem does not wait for the dial tone for the exchange call but continues dialing after a defined waiting time.

Since the outstation and the master station can have different dialing methods and connection types, they can be set separately.

Receiving delay time:
You can set the length of time for which the call acceptance should be delayed separately for the outstation and the master station. Times between 0 and 30 seconds can be defined.

Number of dialing attempts:
You can set how often the outstation should repeat dialing if no connection is made. 0 - 255 repetitions are possible.

Repeat dialing attempt after how many minutes
You can also define the intervals at which these repetitions should occur. Settings from 0 to 255 minutes are possible.

At failure try 2. call number for master:
If the outstation cannot make a connection with the 1st number of the master station, the connection is attempted again with the 2nd number.

Break after ? short messages:

0 The master station tells the APS driver with a command when the connection to an outstation should be aborted.

1-255 The APS driver itself aborts the connection after n short messages from an outstation

2.3 Archiving E6 B2

If the KOS parametering is called from PRO U120, you need not archive the parameters with this menu. When parametering has been terminated and there has been a return to the PRO U120 main program, the data are automatically saved in the file USTx-y.KOS. If a station is archived on diskette in the PRO U120 main program, this file is also saved.

Read data

”Data Archive”,”Read”
(F2 → F1)

All the systems processed so far are listed alphabetically in a window. The arrow marking the selected system can be shifted with <↑> and <↓>. The lines are scrolled at the start and end of the window if more systems exist than can be displayed in the window.

The selection is confirmed with and the previously processed KOS parameter files of this system are then listed. The files are selected according to the same principle as described above.

If the selection of a KOS parameter file was confirmed with, it is loaded into the user memory.

The windows can always be left with <Esc> or <F9>, without a new station being loaded.

Save data

”Data Archive”,”Save”
(F2 → F2)

First a sub directory with the name of the system is opened if it does not yet exist.

The data are saved in these subdirectory with the name USTx-y.KOS. x is the outstation number, y is the KOS slot address in the subrack.

Note When a parameter list is saved, there is a check whether a file with the same name already exists. In this case, a comment appears and there is a query whether the file should be overwritten.

The data are saved in ”Intel-Hex” format. The program enters the current date in the parameter file before saving.

Several stations can be stored on one diskette.

Delete file

”Data Archive”,”Delete file”
(F2 → F3)

As for ‘‘Read data”, all the previously processed systems are displayed in a window and then all the KOS parameter files are listed.

If the selection of a file is confirmed with <Cr>, it is deleted.

The delete function can be aborted with <Esc> or <F9>.

Change drive

”Data Archive”,”Change drive”
(F2 → F4)

Drives A to Z are offered for selection in a window.

The drive identifier can also be entered directly after calling the function with <F4>.

The initial setting is the drive from which PRO → U120 or KOS201P was started. If this setting is changed, e.g. from C to A, drive A is addressed now for the functions ‘‘Read-File”, ‘”Save-File” and ‘‘Delete File”.

2.4 Transfer E6 B3

Parameter List from KOS

”Transfer”,”Parameter list from KOS”
(F3 → F1)

Before the data are transferred from the KOS to the PADT, there is another query whether this function should really be carried out. A confirmation with <J> starts the transfer.

Once the transfer has ended, the KOS firmware part number including the modification index is displayed.

Parameter List to KOS

”Transfer”,”Parameter lists to KOS”
(F3 → F2)

Before the data are transferred from the PUTE to the KOS, there is another query whether this function should really be carried out. A confirmation with <J> starts the transfer.

During the transfer no data are accepted in the data model and in the ring buffer of the KOS.

The current date is passed to the parameter RAM of the KOS during the data transport. In this way you can always determine the last time that the data were transferred to the KOS-RAM.

A comment on the screen shows whether the data transfer is still running or whether it is terminated. The corresponding message appears on the screen if there is an error.

Scan IL Cycle time

”Transfer”,”Scan IL Cycle time” (F3 → F3)

This KOS firmware determines the current IL cycle time. It also notes the longest IL cycle since the start of the outstation. These two cycle times can be interrogated and displayed online.

2.5 Printer Output E6 B4

The printer output is used to list the input parameters. The output is made in DIN A4 format.

The following lists can be printed:


”Printer output”,”Common parameters”
(F4 → F1)


”Printer output”,”Data Model Monitoring Direction/control Direction”
(F4 → F2)


”Printer output”,”Default Set Point Value”
(F4 → F3)


”Printer output”,”Counter Measurand Processing”
(F4 → F4)


”Printer output”,”Ring Buffer Handling”
(F4 → F5)


”Printer output”,”Automatic Polling Service”
(F4 → F6)


”Printer output”,”All Lists”
(F4 → F7)

Selection of Printer E7B6

”Printer output”,”Selection of Printer”
(F4 → F8)

One can select one of the printers DRU 096, DRU 120, DRU 292, DRU 293, DRU 1200, PRT 294 and PRT 295.

Near Letter Quality (NLQ) can be set with <F5> for DRU 120, DRU 292, DRU 293, PRT 294 and PRT 295.

Note The printers must bed set to IBM graphic character set 2.

If the printer is not ready, the corresponding output appears on the screen.

The printer output uses the Centronics interface (LPT1). An output to the serial interface is not advisable since this is already used for the connection to the operating interface of the ALU, the EPROM programming device and the mouse.

Expert If you want to use a printer with serial interface nevertheless, you can change the output to the COM1 or COM2 using the MODE commands in the DOS level before starting the KOS parametering. You can find the necessary commands in the DOS manual.

Printer Output to File **E6 B4**

”Printer Output”,”Printer Output to File”
(F4 → D)

You are asked for the name of the file which is to contain the printer output. The drive identifier and path commands may be entered.

The file is opened in APPEND mode so that all output is written to the same file. This file is only closed when the printer menu is left. If you want to create a file with the same name again, you must first delete the old file in the DOS level as the output is otherwise appended to the end of the file.

Note All the printer control characters are written to this file.

Output to a file is advisable if for example the data point list is to be processed with another editor. You can also use parts of the PRO U120 documentation in other documentation systems.

Note The individual IL blocks are not printed under PRO U120. The IL as generated by PRO U120 has a special format and contains control characters which are again eliminated during reading in Dolog AKF A120. For this reason the IL blocks should be printed using the corresponding functions with Dolog AKF A120.

2.6 EPROM Menu E6 B5

2.6.1 EPROM 27C256 SMD

2.6.1.1 Inserting the EPROMs

With this EPROM (27C256 SMD), an adaptor ADP 004 must be inserted between the Textool socket and the EPROM.

To insert the adaptor, carry out steps Step 1 to Step 6 (see also Figure 11). To insert the EPROMs, follow Step 1 to Step 5 (see also Figure 12).

Step 1 Turn the lever of the Textool socket upwards.

Step 2 Set the adaptor to the Textool socket (hinged side flush to the bottom).

Step 3 Press the lever downwards.

Now that the adaptor is inserted, you can place the EPROM in the adaptor.

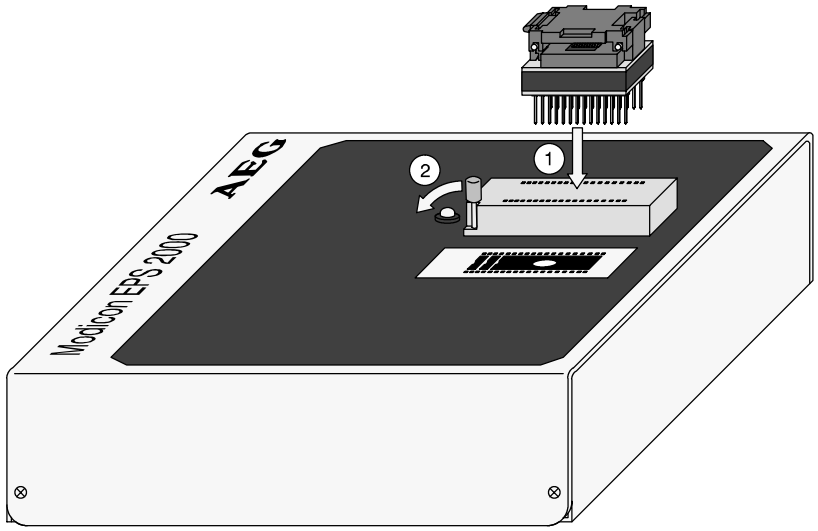


Figure 11 Insert Adaptor ADP 004

Step 4 Open the adaptor ADP 004. Press the opener upwards and lift the cover (see also Figure 12, ① + ②).

Step 5 Insert the EPROM in the adaptor (see also Figure 12, ③). The long contact strip on the underside of the EPROMs must be adjacent to the marking in the adaptor.

Step 6 Close the adaptor.

The EPROM is now inserted and ready for the tranmission.

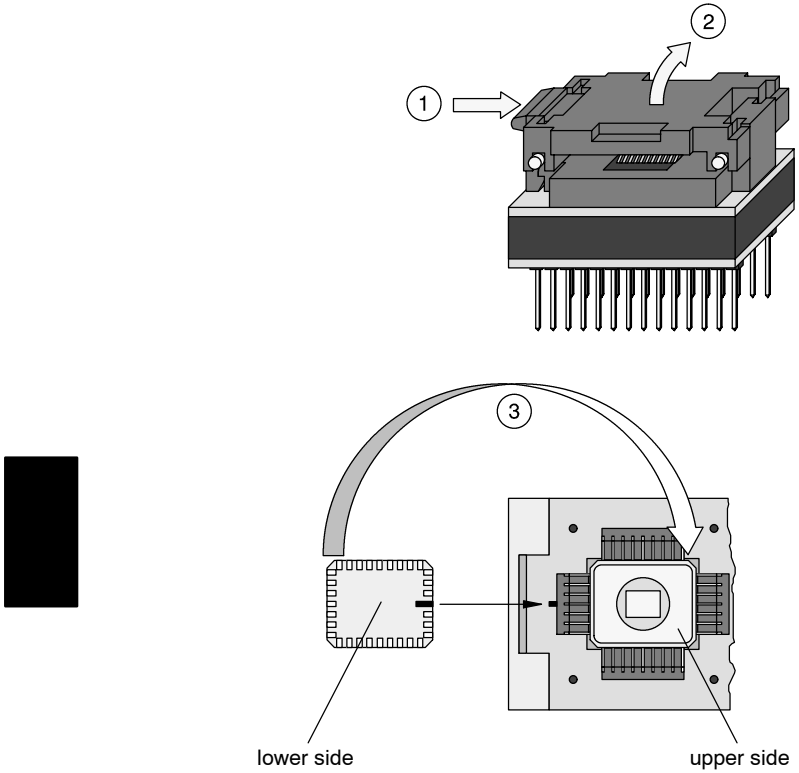


Figure 12 Insert EPROM 27C256 SMD in the Adaptor

2.6.1.2 Removal of the EPROMs

To remove the EPROMs, you must take the following steps:

Warning The EPROM may not be removed as long as the LED on the EPS 2000 is blinking.

Step 1 Open the adaptor ADP 004.

Step 2 Remove the EPROM from the adaptor.

Step 3 Close the adaptor ADP 004.

Step 4 Turn the lever of the Textool socket upwards.

Step 5 Remove the adaptor.

2.6.2 KOS Firmware and Parameter EPROM

The firmware and parameter EPROM are programmed with this menu.

Only the EPROM programming station EPS 2000 can be used. The connection is made with the serial interface COM1.

The different firmware versions are supplied on diskette in the form of INTEL-HEX files. You can decide with which firmware the KOS should be operated. The firmware files are stored by an installation routine on the diskette in the subdirectory ”PRO-FWT\PRO-U120\TEXTE”.

Read Parameter EPROM

”EPROM Menu”,”Read Parameter EPROM”
(F5 → F1)

The range from 7A00H to 7FFFH, in which the parameter lists are stored, is read in. The data are converted and displayed in the corresponding submenues of the ‘‘data input”.

Program Parameter EPROM

”EPROM Menu”,”Program Parameter EPROM”
(F5 → F2)

The parameters are stored in the EPROM range from 7A00H to 7FFFH.

Read Firmware EPROM

”EPROM menu”,”Read Firmware EPROM”
(F5 → F3)

The firmware EPROM is read in from address 0000H to 7FFFH in user memory and can then be copied.

Program Firmware EPROM

”EPROM Menu”,”Program Firmware EPROM”
(F5 → F4)

You have read a programmed firmware EPROM or a firmware file into user memory. The contents of the user memory are now programmed from address 0000H to 7FFFH on an empty EPROM.

Caution Remove the backup battery from the KOS before changing an FW-EPROM.

Read firmware file

”EPROM Menu”,”Read Firmware File”
(F5 → F5)

All the installed firmware files are displayed in a selection window. With <F> you can display the helptext for the firmware version marked with the arrow. After reading the file, the part number and the index of this firmware is displayed on the screen.

The selection is made with <↓> or <↑>. The marked file in the user memory is read in with <Cr>. The function is aborted with <F9> or <Esc>.

EPROM Blank Check

”EPROM menu”,”EPROM Blank Check”
(F5 → F6)

The function ‘‘EPROM Blank Check” can be used to check whether the EPROM to be programmed is empty.

Before each access to the EPROM there is a check whether it was correctly inserted. If this is not the case, the corresponding comment appears on the screen.

An EPROM is read in or programmed in steps of 256 bytes. The processed range is displayed on the screen. Only an empty range can be programmed.

2.7 Reset of PADT Memory E5 B1

After calling “Reset of PADT memory”, there is another query whether you are sure that this function should be carried out. If this is confirmed, all the data are deleted and the standard parameter values are set.

Standard parameters:

SEAB version:	SEAB-1F
Outstation number:	0
Baudrate:	600 Bd
Lead time:	5 tBit
Trailer time:	5 tBit
Pause time:	5 tBit
Quit LT:	60 tBit
M5 lead time:	12 tBit
M5 trailer time:	12 tBit
DTI for MW8:	5000
DTI for MW11:	5000
Ring Buffer overflow warning at:	3072
Read ring buffer only after GA:	no
DCF-receiver:	no
SEAB-1F telegrams with 4 data bytes:	yes
Start conditions:	Hot restart
Analog value scaling:	0-2047
Transfer time and date to IL:	yes

2.8 Bottom-Up Configuration Export E6B6

"Bottom-Up Configuration Export","Generate Export File"
(F7 → F1)

The PV number range of the particular KOS module is first defined by entering the first and last object numbers. Object numbers between 1 and 65535 are possible. The generation of the export file is then called.

The range should contain some reserve for extensions since it is not possible to define or extend individual object numbers. A range of about 300 numbers is recommended, since this covers the maximum number of PVs which can be configured with PRO-U120.

The maximum number of PVs which can be transferred with a KOS 201 is 2048. This number, however, is a theoretical value based on 64 x 16 informations plus 64 x 16 commands. This number of PVs will hardly be reached, even with a user-dependent IL.

If a defined area is extended upwards and the generation is then called, this has no effect on the PV numbers which were already assigned. You must simply ensure that the range does not overlap with other outstations, since there is a plausibility check for the import functions of other configuration tools (e.g. PRO-Z120 and PRO-UZ120). If a range is shifted or extended downwards, all the object numbers are reallocated.

Note If the data of an existing KOS parameter assignment (SEAB parameter, number of messages, etc.) were changed, the PV number list must always be generated again.

If the "old" PV number list is not completely deleted (see "Delete PV Number List") , the data are extended or removed from the existing list. Extension here means that the next free object number is allocated to a new message.

“Bottom-Up Configuration Export”, “Delete PV Number List”
(F7 → F2)

A reallocation of the PV numbers can be forced by deleting the PV list as well as by automatically reallocating by extending the object number range downwards. Reallocation means that all the PVs are assigned sequential object numbers sorted according to F and A1 bytes.

If PVs are deleted from an existing configuration, gaps may occur in the object numbers. These gaps are maintained after a new generation run unless the PV list was deleted and all numbers were reallocated.

General information:
Since the bottom-up configuration is called by the KOS parameter assignment, all the messsages parametrized in the menues “Data Monitoring Direction” and”Data Control Direction” are included, also those configured “manually” afterwards.

Relocated counted measurands are also entered in the list if the transfer bit was parametrized for relocated counted measurands. The counted mesurand and the relevant relocated counted measurand have the same object numbers, but different PV attributes.

Caution In operations with 2 KOS modules in one outstation, you should ensure that they are operating with different substations or master stations for a successful bottom-up configuration. The configuration of redundant lines is not included in the bottom-up configuration.

Data storage:
The files with the data for the bottom-up configuration are stored in the system directory with the name Uxxx-yyy.KOM. The file structure is described in Part V.

Example: C:\ANLAGE1.PRO\FW\U000-001.KOM

xxx = Outstation number
yyy = line number or slot of the KOS if KOS201P is started directly

Part V
File Structures

Chapter 1
File Structures

1.1 Bottom-Up File

The bottom-up file generated in the outstations has the name Uxxx-yyy.KOM. The same file can also be generated for the slave KOS of a substation. These are given the names Zxxx-yyy.KOM.

xxx = outstation or substation number
yyy = line number

The files are stored in the subdirectory of the particular system (e.g. `C:\ANLAGE1.PRO\FW\U000-001.KOM`)

The file for the bottom-up configuration has three parts with the following structure:

```
struct head  File header
struct comm  Communications data
struct pv    PV number list
```

Structure of file header:

```
struct head
   {
    char tool[10]; (Text)  Name of the tool (e.g. PRO-U120)
    char version[5]; (DEC) Version of the tool (e.g. 02.01)
    char date[10]; (DEC)   Date of last file processing
   }
```

Structure of Communications File:

```
struct  comm
 {
 char mode[1];       (DEC)1=master, 2=slave
 char baud[5];       (DEC)baud rate
 char lead[3];       (DEC)lead time
 char ovtr[3];       (DEC)trailer time
 char pause[3];      (DEC)pause time
 char rept_kt[3];    (DEC)call repetition KT
 char  rept_lt[3];   (DEC)call repetition LT
 char s_r_lt[3];     (DEC)send repetition LT
 char ackno[5];      (DEC)acknowledge long message
 char M5led[3];      (DEC)M5 lead time monitoring
 char M5trl[3];      (DEC)M5 trailer time monitoring
 char with_m5[1];    (DEC)0=with M5, 1=without M5
 char list[1];       (DEC)list: 1=SEAB-1F, 2=APS
 char pv_strt[5];    (DEC)start of object number range
 char pv_end[5];     (DEC)end of object number range
 char s_idnt[12];    (DEC)station identifier
 char new_strt[3];         (DEC)new inquiry if disturbed
                           outstation after n polling scans
 char multi_1[12];   (DEC)multicast command 1
 char multi_2[12];   (DEC)multicast command 2
 char multi_3[12];   (DEC)multicast command 3
 char multi_4[12];   (DEC)multicast command 4
 char multi_5[12];   (DEC)multicast command 5
 char multi_6[12];   (DEC)multicast command 6
 char multi_7[12];   (DEC)multicast command 7
 char multi_8[12];   (DEC)multicast command 8
 }
```

The parameters s_idnt, new_strt, multi_n were included in the file structure in preparation for MODNET-1W.

Structure of PV Number List:

```
struct pv
 {
  char pv_attr[2] (HEX)   PV attribute
  char kpv_cnr[4] (HEX)   PV counter number
  char a[2];      (HEX)   A-Byte SEAB-1F
  char f[2];      (HEX)   F-Byte SEAB-1F
  char a1[2];     (HEX)   A1-Byte SEAB-1F
 }
```

A combination of the A1 and D1 bytes and not just the A1 byte are stored here in commands. This pseudo-A1 byte always describes 16 commands.

0	=	command	1 -16
1	=	command	17-32
2	=	command	33-48 etc.

The structure 'struct pv' is generated for each message and corresponds to one line in the file .KOM. The length of the file .KOM varies because of the variable number of data points. The last line contains only ZEROES as en d code.

List of the PV attributes:

128	Monitored informations
129	Real-time informations
130	Transient information
131	Measurand 11-bits with sign
132	Measurand 8-bits without sign
133	Counted measurand
134	Relocated counted measurand
135	Commands
136	Analog setpoint values
137	Digital setpoint values
138	System informations
139	System commands

Example File U020-001.KOM:

```
PRO-U120
04.00
28.05.1992
2
00600
015
005
016
-/-
-/-
-/-
00060
020
020
000
1
00301
00600
-/-
-/-
-/-
-/-
-/-
-/-
-/-
-/-
-/-
-/-
80012D140A00
80013D140A01
80014D140A02
85015D142A00
85015E142A01
85015F142A02
850160142A03
850161142A04
850162142A05
850163142A06
850164142A07
830165144A00
830166144A01
830167144A02
830168144A03
810169145A00
```

```
8A0179147A00
870189149B00
870199149B01
8901A914CB00
8901AA14CB01
8801AB14CB02
8801AC14CB03
000000000000
```

This is a file of an outstation. A file with the same structure is generated for the slave-KOS of a substation. Different A-bytes are entered in the file, however, in transparent mode of a substation. The files of a substation are identified by the leading Z in the file name (e.g. Z020-002.KOM).

Part VI
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Part VII
Appendix