

Operating Manual

**ABB Procontic
Programming System**

907 PC 332
Programming and Test Software
System-Specific Part
ABB Procontic T200

Order No.:
GATS 1339 35 R 2001

**ABB Schalt-
und Steuerungstechnik**



Preface

Notes for User

All commands you have to enter are given in *Italics*. Keys appear as *<key>*. Screen displays, e.g. messages, appear in **bold**.

Instead of the *<Enter key>*, you can also press the *<left mouse button>*. You can use the *<right mouse button>* instead of the *<Space bar>*. In the event of Yes/No prompts, you can use the *<left mouse button>* for Yes and the *<right button>* for No.

Main menu: Selection of a main menu option is enabled or ascertained after you have pressed the *<right mouse button>*. You can press the *<left mouse button>* to execute the submenu option you have selected.

Key stroke combinations:

<Key> -key or *<Key> -key-key*.

In this case, press and hold down the first key and, in doing so, press the other keys then specified.

Example 1: *<Alt> -2*

Press and hold down the *<Alt>* key while at the same time pressing the key *<2>*.

Example 2: *<Ctrl> -K-W*

Press and hold down the *<Ctrl>* key while at the same time pressing the *<K>* and *<W>* keys in succession.

Calling online commands by means of hot keys

Hot keys serve to swiftly select functions that can be executed alternatively from pop-up menus, e.g. *<Alt> -S* for 'Start PLC' (see Section 2, Help, 'ONLINE commands').

Selecting options in the pop-up menus

Swift selection: By entering the highlighted letter in the menu line. There is no need to position the cursor by pressing *<Cursor up key>* and *<Down>* or to use the mouse.

Keyboards

The designations of certain keys on keyboards with German, English, or American character set resp. are different. The following table shows the relations:

German keyboard	English/American keyboard
<i><Strg></i>	<i><Ctrl></i>
<i><Einfg></i>	<i><Ins></i>
<i><Entf></i> or <i><Löschen></i>	<i></i>
<i><Bild ↑></i>	<i><PgUp></i>
<i><Bild ↓></i>	<i><PgDn></i>
<i><Pos 1></i>	<i><Home></i>
<i><Ende></i>	<i><End></i>
<i><WR></i>	<i><Return></i>
<i><Tab. rechts></i>	<i><RTAB></i>
<i><Tab. links></i>	<i><LTAB></i>
<i><◆></i>	<i><Shift>L</i>

In this manual the *<Enter-key>* is used; other current designations for this key are *<Eingabe-Taste>*, *<Return>* and *<WR>*.

Abbreviations

CE	Connection element
FBD	Function block diagram
IL	Instruction list
LD	Ladder diagram
PLC	Programmable logic controller
UP	User program
ZE	Central unit

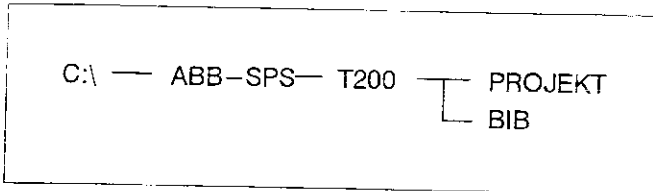
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1 Installation

The installation of the programming and test software 907 PC 33 with the operating system MS-DOS is described on the following pages step for step. If you have problems with some MS-DOS-terms, please consult the MS-DOS-manual of your PC.

The installation program creates the following directories under MS-DOS:



Note

At least 10 MBytes space on your hard disk must be free for installation. The installation program displays an appropriate message if not enough space is available. Free **main memory of at least 500 kBytes** is also needed. Enter the DOS command *CHKDSK* to obtain information about free memory.

The installation program checks the FILES and BUFFERS entries in the CONFIG.SYS file and, if necessary, corrects them to the values required to operate 907 PC 332:

FILES = 25

BUFFERS = 25

1.1 Installing the programming software on the PC

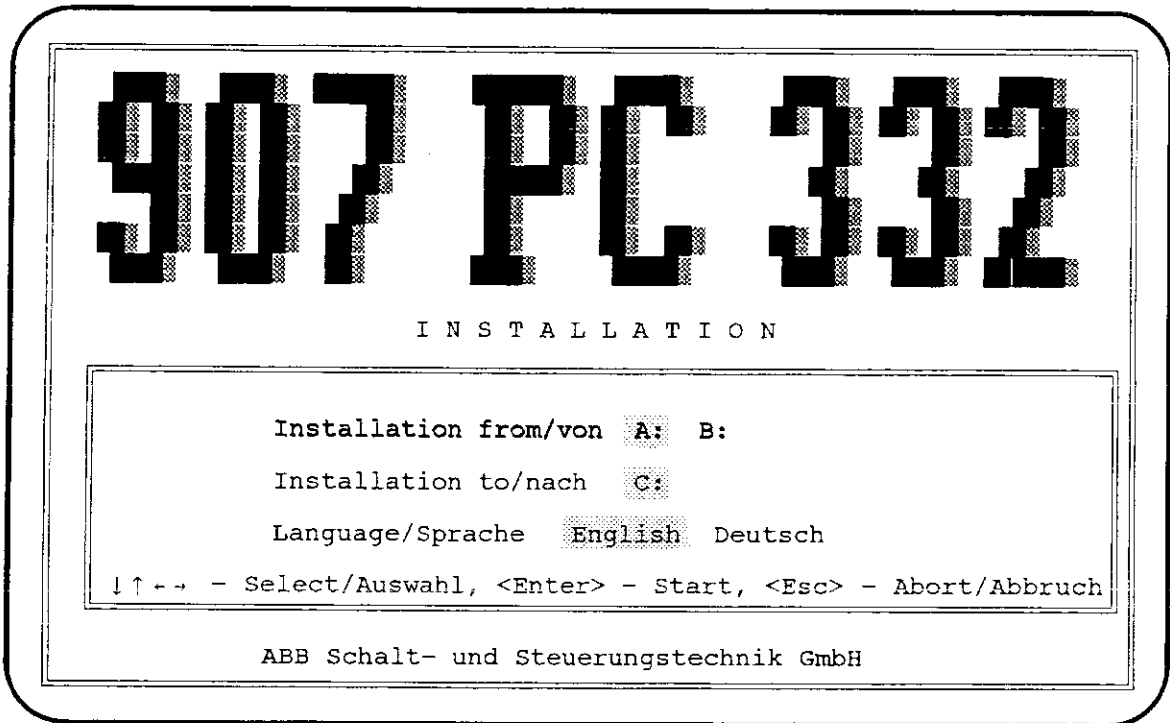
The programming software 907 PC 332 is supplied on 2 floppy disks. If a version of 907 PC 332 already exists on your PC please first read the instructions at the end of this page.

Insert disk 1 in drive A. Enter the following instruction:

```
A: INSTALL <Enter key>
```

The installation program searches now the drives on your PC.

The following display appears:



You can switch to the individual lines by pressing the *<Cursor up key>* and *<Down>*. You can select an option by pressing the *<Cursor left key>* and *<Right>*. You can choose a drive: in the first line the drive, which contains the installation disk; in the following line the desired harddisk. Choose the desired language. Start the installation pressing the *<Enter key>*.

If the values for FILES and BUFFERS in the file CONFIG.SYS have to be changed, the installation program will do this automatically. An appropriate message will be prompted. Installation is continued after the *<Enter key>* is pressed.

When the installation is finished the following message appears (drive chosen: C:):

907 PC 332 has been installed completely.

Remove the installation disk from the drive and enter

C:\T200

for starting.

If the file CONCFG.SYS has been changed, press first <Ctrl> <Alt> to start the PC again.

Note

The installation program checks when starting if an older version of 907 PC 332 already is installed. The installation can only be executed if the older version is overwritten by the new version. **If you have important data in the subdirectory ABB-SPS\T200 you must save them first. All files in the directory T200 will be deleted and overwritten by new files during installation.**

If problems arise during the automatic installation, you can also execute the manual installation.

If you want to execute an **Update–Installation** you must update your library

Start the programming software as described under "1.2. Starting the programming software" and choose "Library", "Read Manufacturer Library". Enter "NEU" (if you want to work with the German version) resp. "NEW" (if you want to work with the English version). The existing library will be updated. Your user CEs will be conserved.

1.1.1 Manual Installation

If you execute the installation manually you must distinguish, if it is a new installation or if an older version of 907 PC 332 already exists. In this case an installation can only be executed when the older version is overwritten. **If you have important user data in the subdirectory ABB–SPS\T200 you must save them first.** All files in the directory T200 will be deleted and overwritten by new files during installation. The following steps describe the manual installation of the programming software, divided up in new installation and update installation. The installation is described from drive A: to harddisk C:. Adjust the drive names if you are using other drives.

Enter the following commands on drive C:\ ; push the <Enter key> after each line: Insert disk 1 in drive A:.

New installation

```
C:\> COPY A:T200.BAT
C:\> MD \ABB-SPS
C:\> CD \ABB-SPS
C:\ABB-SPS> MD T200
C:\ABB-SPS> CD T200
C:\ABB-SPS\T200>
```

Enter the following command:

```
C:\ABB-SPS\T200> COPY A:T200V2.?
```

Insert disk 2 in drive A: Enter the following command:

```
C:\ABB-SPS\T200> COPY A:T200V2.?
```

Continue with the following commands:

```
C:\ABB-SPS\T200> A:PACKEN T200V2.EXE T200V2
C:\ABB-SPS\T200> T200V2
```

These steps will take some minutes. Answer displays asking for ('Overwrite?') with 'Y' (Yes). Then enter the following commands:

```
C:\ABB-SPS\T200> DEL T200V2.*
C:\ABB-SPS\T200> MD BIB
C:\ABB-SPS\T200> MD PROJEKT
C:\ABB-SPS\T200> COPY ONLINE?.OE PROJEKT
C:\ABB-SPS\T200> DEL ONLINE?.OE
C:\ABB-SPS\T200> COPY RESERR.OE PROJEKT
C:\ABB-SPS\T200> DEL RESERR.OE
```

Update installation

```
C:\> CD \ABB-SPS
C:\ABB-SPS> CD T200
C:\ABB-SPS\T200> DEL *.*
```

Enter the following command:

```
C:\ABB-SPS\T200> COPY A:T200V2.?
```

```
C:\ABB-SPS\T200> COPY A:T200V2.?
```

Continue with the following commands:

```
C:\ABB-SPS\T200> A:PACKEN T200V2.EXE T200V2
C:\ABB-SPS\T200> T200V2
```

```
C:\ABB-SPS\T200> DEL T200V2.*
C:\ABB-SPS\T200> COPY ONLINE?.OE PROJEKT
C:\ABB-SPS\T200> DEL ONLINE?.OE
C:\ABB-SPS\T200> COPY RESERR.OE PROJEKT
C:\ABB-SPS\T200> DEL RESERR.OE
```

If you want to use the German version, enter the following commands:

```
C:\ABB-SPS\T200> COPY T200_F_D.TEX T200_F.TEX
C:\ABB-SPS\T200> COPY T200_D.VE? BIB\T200.*
C:\ABB-SPS\T200> DEL T200_*.VE?
C:\ABB-SPS\T200> COPY T200_D.* T200.*
```

```
C:\ABB-SPS\T200> COPY T200_F_D.TEX
T200_F.TEX
C:\ABB-SPS\T200> DEL T200_*.VE?
C:\ABB-SPS\T200> COPY NEU.* BIB
C:\ABB-SPS\T200> COPY T200_D.* T200.*
```

If you want to use the English version, enter the following commands:

```
C:\ABB-SPS\T200> COPY T200_FG.TEX T200_F.TEX
C:\ABB-SPS\T200> COPY T200_GB.VE? BIB\T200.*
C:\ABB-SPS\T200> DEL T200_*.VE?
C:\ABB-SPS\T200> COPY T200_GB.* T200.*
```

```
C:\ABB-SPS\T200> COPY T200_FG.TEX
T200_F.TEX
C:\ABB-SPS\T200> DEL T200_*.VE?
C:\ABB-SPS\T200> COPY NEW.* BIB
C:\ABB-SPS\T200> COPY T200_GB.* T200.*
```

Enter now the following commands:

```
C:\ABB-SPS\T200> RENAME T200_DA.EXE T200_D.EXE C:\ABB-SPS\T200> RENAME T200_DA.EXE
T200_D.EXE
C:\ABB-SPS\T200> DEL NEU.* C:\ABB-SPS\T200> DEL NEU.*
C:\ABB-SPS\T200> DEL NEW.* C:\ABB-SPS\T200> DEL NEW.*
```

New-Installation

The installation is completed

Update-Installation

The installation is completed. You must check the values for FILES and Buffers in the CONFIG.SYS file before starting. The values must be 25 at min. and be corrected to this value. If you change the file CONFIG.SYS restart the PC afterwards.

Start now the programming software as described under "1.2 Starting the programming software" and choose "Library", "Read Manufacturer Library". Enter "NEU" or "NEW" resp. for name. The existing library will be up-dated. Your user CEs will be conserved.

Remove disk 2 from drive A:.

Remove disk 2 from drive A:.

1.2 Starting the programming software

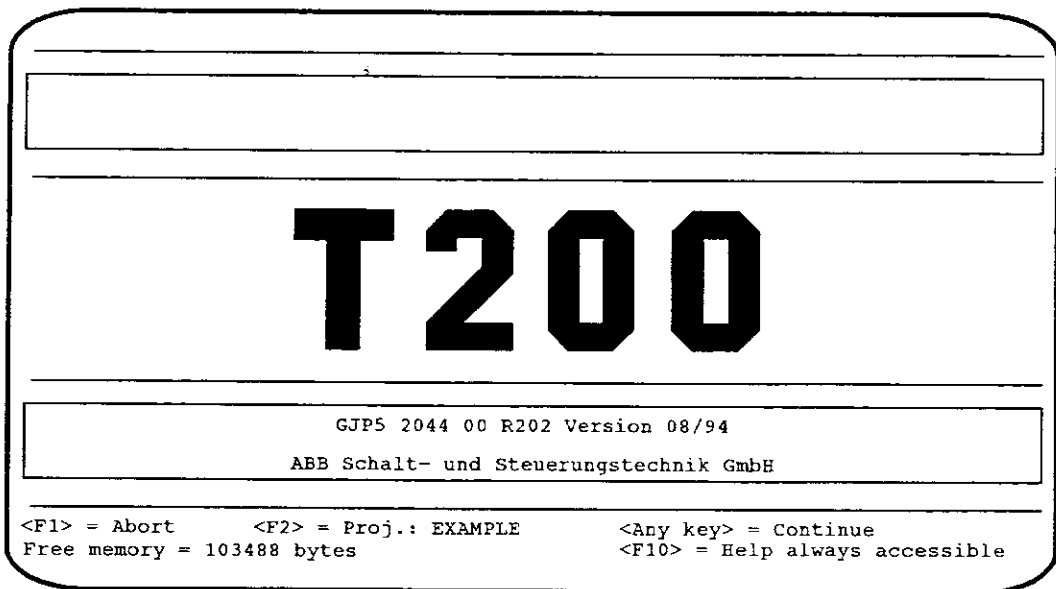
The following text presumes that you have installed the programming software on drive C:.

During the installation, the batch file T200.BAT was installed in the root directory. You can start now the programming software as follows:

```
C:\T200 <Enter key>
```

Start your programming software. The programming software's greeting screen appears.

Display:

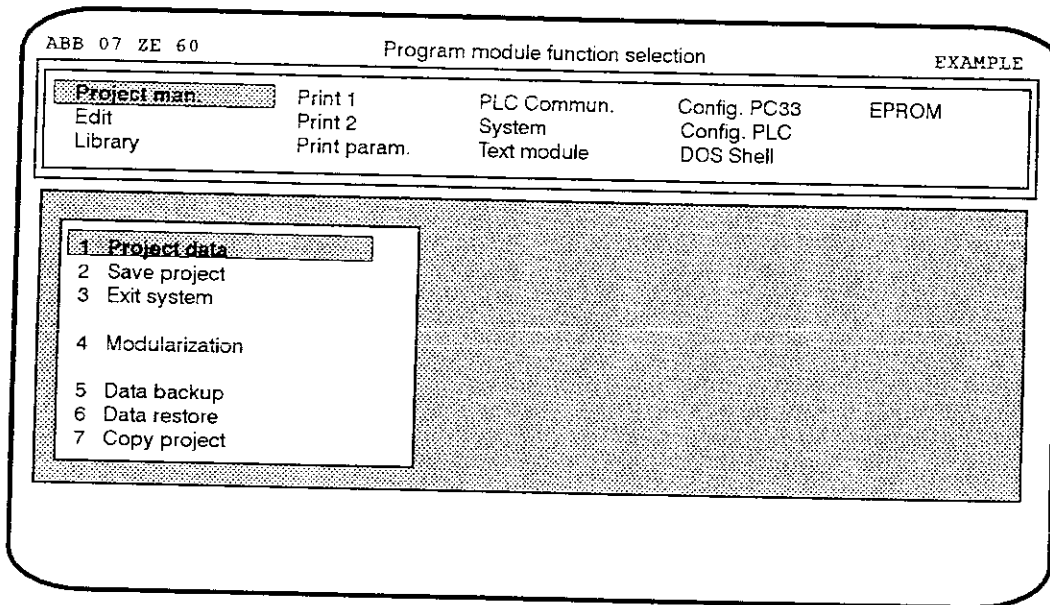


For starting the project EXAMPLE, press <F2>. Enter T200 as password and press the <Enter key>. The main menu appears now, on which you can modify the project.

2 Project data

2.1 Project management (Project man.)

After you have selected the main menu option *Project man.*, 907 PC 332 shows the following display:



1 Project data

907 PC 332 shows the following display when you call the menu option *Project data*:

ABB 07 ZE 60		Project data		EXAMPLE	
PLC manufacturer : ABB		PLC name : T200		PLC Version	
Project : PROJEKT\EXAMPLE Library : BIB\T200				07 ZE 60	
PLC type : 07 ZE 60		Timeout		07 ZE 61	
Responsible :		Last change		07 ZE 62	
Project designation :					
Project description:					

The *Project data* menu contains entries relevant to creating, editing and documenting the PLC user program. See 907 PC 33, chapter 5 for possible entries.

PLC type

Start off by selecting the PLC type field with the cursor. A setting is made by pressing the space bar and by selecting the central unit by means of the *<Cursor keys>*.

When using the 07 ZE 63, you may select either the 07 ZE 61 setting or the 07 ZE 62 setting.

Important:

Changes made here affect main memory management within the programming system. This is why you must pay particular attention to making sure that the project file specified under Project data matches the central unit used.

The maximum number of word flags and the program memory size are converted here.

All further settings in the display shown above are explained in the Operating Manual 907 PC 33, General part, chapter entitled 'Project data'.

Note for Timeout

The setting of timeouts with Txxx can cause some PCs to prompt the error message "Time for reception out" when starting the Online-Functions. In this case the Timeout has to be corrected to a value of xxxxx. Further hints in the General Part.

3 Configuring

3.1 Main menu option *Config. PC33*

3.1.1 Module configuration

The method of flag assignment and the reserve configuration are defined here.

Default flag assignment:

Flag assignment when translating the FBD/LD or the extended IL can be set globally or locally. For commissioning it is expedient to set flag assignment globally. In this case, for example, precisely one connecting line between two connection elements in the FBD/LD is then assigned to one flag.

Module code res:

You can define a default code reserve here. The default is the value 10 (corresponding to 10 NOPs). This reserve is appended to the end of the project during translation.

Default SP Res:

The default code reserve applies to every segment plan. See Chapter 7 for further details of code reserves.

3.2 Main menu option *Config. PLC*

3.2.1 Configuring the programming interface

The *Prog. interface* menu is needed only if the PC is connected to a system with ZB 20 bus or to the communication processor 07 KP 60. The normal mode is <Local ZE>, i.e. the PC communicates with the central unit of the system to which it is connected through the serial interface of the central unit or of the 07 KP 60. If it is connected directly to the central unit or a remote I/O station, the following interface parameters apply:

Channel : COM1
Baud rate : 19200
Data bits : 7
Stop bits : 1
Parity : even

If the PC is connected via the communication processor 07 KP 60, the interface parameters on both units must be set to the same settings, i.e. with "Interface parameters" on the PC and with the corresponding DIP switches on the 07 KP 60.

If you wish to communicate with the central unit of another system through the ZB 20, you must select the <Remote ZE> setting. The ZB 20 ring No. and the station number must also be set accordingly.

Select the appropriate programming interface with the <Cursor left> / <Cursor right> keys and the programming interface selected will then be highlighted. You can then enter or select the affiliated parameters depending on the interface you have chosen.

Press the <Esc key> whenever you wish to quit the configuration menu. You are prompted to specify whether or not you wish to save the changes.

The following menus appear depending on the interface selected:

Screen when selecting "Local ZE"

ABB 07 ZE 60 Programming interface configuration EXAMPLE

Local ZE Interface parameters Remote ZE

This screenshot shows the 'Programming interface configuration' screen for 'ABB 07 ZE 60'. The title bar includes 'EXAMPLE' on the right. Three buttons are visible at the top: 'Local ZE' (which is highlighted with a stippled background), 'Interface parameters', and 'Remote ZE'. The main area of the screen is empty.

Screen when selecting "Remote ZE"

ABB 07 ZE 60 Programming interface configuration EXAMPLE

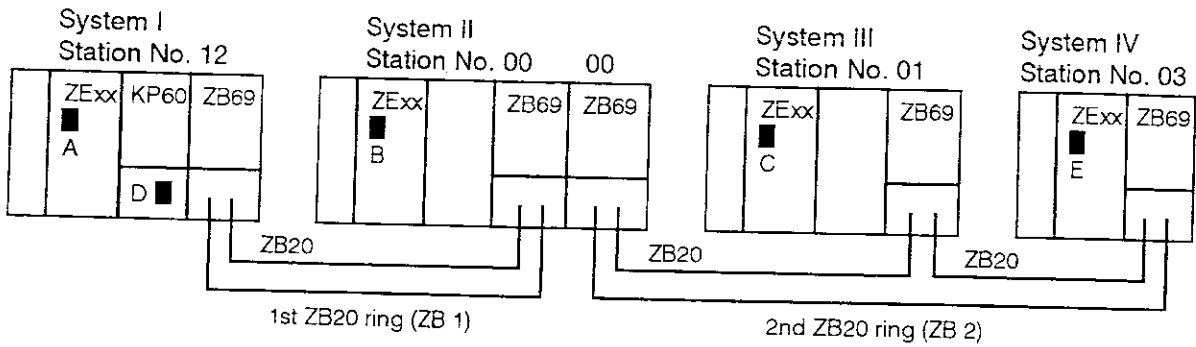
Local ZE Interface parameters Remote ZE

ZB (1/2) : 1
Station (0...63) : 0

This screenshot shows the 'Programming interface configuration' screen for 'ABB 07 ZE 60'. The title bar includes 'EXAMPLE' on the right. Three buttons are visible at the top: 'Local ZE', 'Interface parameters', and 'Remote ZE' (which is highlighted with a stippled background). Below the buttons, a central box displays the following configuration parameters:

ZB (1/2)	:	1
Station (0...63)	:	0

Example of access by the PC to networked systems



Settings when the programming system is accessed from:

Interface	to system			
	I	II	III	IV
A	Local ZE	Remote ZE ZB 1 / St. 00	not possible	not possible
B	Remote ZE ZB 1 / St. 12	Local ZE	Remote ZE ZB 2 / St. 01	Remote ZE ZB 2 / St. 03
C	not possible	Remote ZE ZB 1 / St. 00	Local ZE	Remote ZE ZB 1 / St. 03
D	Local ZE *	Remote ZE *	not possible	not possible
E	not possible	Remote ZE ZB 1 / St. 00	Remote ZE ZB 1 / St. 01	Local ZE

If the interface is set to "Remote ZE", the number of the ZB20 ring and the substation number are displayed after you select "Send program".

Note:
The ring designated ZB 2 in the figure has the designation/address ZB 1 when viewed from systems III and IV!

* In these cases the interface may be set to any settings by means of "Interface parameters". The parameters must, however, agree with the settings on the 07 KP 60.

Screen when selecting "Interface parameters"

ABB 07 ZE 60 Programming interface configuration EXAMPLE

Local ZE **Interface Parameters** Remote ZE

Channel : COM2

Baud rate : 300 600 1200 2400 4800 9600

Data bits : 8

Stop bits : 2

Parity : none odd

3.2.2 System

System configuration

All data concerning the I/O configuration of the ABB Procontic T200 is entered here.

Note

When sending the program to the PLC, the I/O configuration is also sent. If still no I/O configuration has been defined, the current I/O configuration is read out of the PLC before translation and this is then transferred together with the program. When reading the program from the PLC, the system configuration is read out of it first.

GET: All units in the basic subrack are specified here.

BE 60 – BE 62: Limits to the number of slots for the various expansion subracks.

1. EW – 5. EW: All units belonging to the central expansion subrack are specified here.

L 01 – L 04: Number of the remote I/O line: This depends on the slot of the coupler 07 BR 60 in the basic subrack.

0. UST – 9. UST: All units belonging to a remote substation are specified here.

By means of the <PgUp>/<PgDn> keys, you can switch from configuration of the central expansion to the displays for the remote expansions. Each screen page shows one remote I/O line with up to 10 substations. That is to say, 5 screens exist for you to configure central and remote expansions.

The screen page is split into two. The slots of the units are displayed on the left, while the possible modules/units are displayed on the right.

Selecting modules

Move to the slot with the <Cursor keys> or the mouse and make a selection by pressing the <Enter key> or the <Left mouse button>. The cursor moves to the right-hand field for selection of a unit. Here, once again move to a field with the <Cursor keys> or the mouse and make a selection with the <Enter key>. The selected module then appears at the selected slot in the left-hand field and is now known to the system. Leave the menu again by pressing the <ESC key>. If you answer yes to the "Save configuration" prompt, this configuration is assigned to the project and is transferred to the PLC along with the program. For the central unit, this list serves to compare the required configuration to the real one.

References between configuration entries and modules

E16:	07 EB 60 R1, 07 EB 63 R1, 07 EB 66 R1, 07 EB 67 R1
E32:	07 EB 61 R1, 07 EB 62 R1, 07 EB 64 R1
E64:	07 EB 90–S
A16:	07 AB 60 R1, 07 AB 62 R1, 07 AB 67 R1, 07 AB 68 R1
A32:	07 AB 61 R1, 07 AB 63 R1
A64:	not used
EA16:	not used
EA32:	07 AB 90–S
EW4:	not used
EW8:	07 EA 60/61/62/63/64/65/66/67 R1, 07 EA 90–S
AW4:	07 AA 60 R1, 07 AA 61 R1, 07 AA 62 R1, 07 AA 63 R1, 07 AA 65 R1
AW8:	not used
EAW4:	07 ZG 60 R1, 07 PO 60 R1, 07 KT 60 R1
EAW8:	not used
BR60:	right slot of the coupler for a remote I/O line. 2 slots are always assigned.
ZB60:	right slot of the coupler for the ZB 10 bus. 2 slots are always assigned.
ZB69:	right slot of the coupler for the ZB 20 bus. 2 slots are always assigned.
EI60:	interrupt input module 07 EI 60
KP60:	right slot of the communication processor 07 KP 60. 2 slots are always assigned.
KP6X:	communication processor 07 KP 62, 07 KP 64
IR60:	right slot of the industrial computer 07 IR 60 (BASIC); the two left slots must remain free.
CS61:	coupler for CS31, 512 I/O points
CS6B:	coupler for CS31, 1024 I/O points
BA16:	not used
BA32:	place-holder for the units E16/A16
BA64:	place-holder for the units E32/A32/AW4
CLR:	deletion of an entry.

For configuration entries of CS31 modules see ABB Procontic T200 System Description at 07 CS 61.

Note

Refer to the T200 system description, chapter entitled 'Remote I/O coupler 07 CS 61' for details of how to set the CS31 modules.

You can press the <Space bar> or the <Right mouse button> to call or exit the module selection menu without saving a module.

The following examples show the screen page of the basic system and of one remote I/O line.

ABB 07 ZE 60 Configuration of centr. I/O expansions											EXAMPLE	
L 00	00	01	02	03	04	05	06	07	08	09	Modules	
GET	E16	E32	A32					ZB69				
EW	BE 00		BE 01			BE 02						E16 E32 E64 A16 A32 A64 EA16 EA32 EW4 EW8 AW4 AW8 EAW4 EAW8 BR60 ZB60 ZB69 EI60 KP60 KP6X IR60 CS61 CS6B BA16 BA32 BA64 CLR
1.EW		AW4		EWS	AW8							
2.EW												
3.EW												
4.EW												
5.EW												

Screen page of the basic system.

ABB 07 ZE 60 Configuration of remote I/O expansions											EXAMPLE
L 01	00	01	02	03	04	05	06	07	08	09	Modules
0.UST		E32	A32								
1.UST		E32	E32								E16 E32 E64 A16 A32 A64 EA16 EA32 EW4 EW8 AW4 AW8 EAW4 EAW8 BR60 ZB60 ZB69 EI60 KP60 KP6X IR60 CS61 CS6B BA16 BA32 BA64 CLR
2.UST											
3.UST											
4.UST											
5.UST											
6.UST											
7.UST											
8.UST											
9.UST											

Screen page of the first remote I/O line. The number of the remote I/O line is displayed on the top left.

3.2.3 Buffered Variables/Configuration of Variables

Configuring the flag areas

The buffered variable areas and the coupler areas are entered here. By default, no variable is buffered, i.e. the areas are blank.

Use the <Cursor keys> to select the fields.

You can quit flag configuration by pressing the <Esc key>. You are prompted to specify whether or not you wish to save the changes.

Buffered variable areas

Here, you can separately specify a part for each variable area that is not to be normalized, i.e. buffered. The validity of the entered address area is checked when you exit the menu. Make inputs as follows:

<Operand identifier> <Start address> – <End address>

Example: MW 0020,00 – 0033,01

Coupler areas

The source data area for the ZB 10 or ZB 20 coupler is defined here. This area may then be addressed as an output in the program.

The following example shows the input mask for the configuration of the variables:

ABB 07 ZE 60	Configuration of Variables	Example
Buffered variable areas		
Range for bit flags	:	M 000,00–010,00
Range for word flags	:	MW 0000,00–0032,00
Range for step	:	S 000,00–005,00
Range for timer	:	T 13,00–15,15
Range for counter	:	Z 00,00–00,05
Coupler area		
Range for coupler 1	:	AW'0000,00–1023,00
Range for coupler 2	:	AW'1024,00–2047,00

3.2.4 System reaction

Configuring system reactions

The external start input, the cycle timeout, the PLC's reaction to error states and permission for the programming system to access the PLC are entered or selected here.

The defaults are highlighted.

Use the <Cursor keys> to select fields.

Press the <Esc key> whenever you wish to exit configuration of the system reactions. You are prompted to specify whether or not you wish to save the changes.

The following example shows the system reactions input mask:

ABB 07 ZE 60	Configuration of the system reactions	EXAMPLE
Ext. Start input _____	: E	
Cycle monitoring time (msec) _____	: 250	
Error in centr. I/O configuration; ZE _____	: Message	Stop
Error in centr. I/O expansion; ZE _____	: Message	Stop
Error in remote I/O coupler module; ZE _____	: Message	Stop
Error in remote I/O config.; transmission _____	: Message	Stop
Error in remote substation; transmission _____	: Message	Stop
Debug access permission _____	: Yes	No
Start without output allowed _____	: Yes	No
External RUN/STOP mode allowed _____	: Yes	No

Ext. Start input: E

Here, you may specify any input defined in the configuration as an additional start condition. That is to say, the PLC starts only if this input is "1" and the key switch is set to RUN or REMOTE and is started from the computer.

Cycle monitoring time (msec): 250

You can specify the maximum cycle time here in increments of 10 ms. The maximum value is 990 ms.

Error in centr. I/O configuration; ZE: Message or Stop

This entry defines whether the central unit is to stop after an error has occurred in the central I/O configuration or whether it is only to issue a message.

Error in centr. I/O expansion; ZE: Message or Stop

This entry defines whether the central unit is to stop after an error has occurred in the central I/O expansion or whether it is only to issue a message.

Error in remote I/O coupler module; ZE: Message or Stop (1)

This entry defines whether the central unit is to stop after an error has occurred in a remote I/O expansion (coupler error) or whether it is only to issue a message.

Error in remote I/O config.; transmission: Message or Stop (2)

This entry defines whether a defective configuration of the remote I/O expansion (E7) *) is to be considered as a coupler error and whether the central processing unit is to stop or is only to issue a message. This may be necessary for step-by-step commissioning of a system without complete addition of a remote I/O expansion.

Error in remote substation; transmission: Message or Stop (3)

This entry defines whether a transfer error (E1) *), a transfer timeout error (E2) *), a communication error with the central unit (E5) *), allocation of a duplicate substation number (E6) *) or a malfunctioning connection to a substation (E8) *) is to be considered to be a coupler error and whether the central unit is to stop or is only to issue a message.

If this parameter is set to "Stop", the central unit only stops after one of the above mentioned errors has occurred if "Stop" is also set for (1).

Note on (1), (2) and (3): The table overleaf refers to this.

*) Error number, output on the coupler 07 BR 60

Access permission debug: Yes or No

This entry concerns possibilities of access to the central unit through external computers, e.g. through the PC. The setting for "DEBUG" enables or disables the test functions such as HALT, CONTINUE, FORCE, OVERWRITE or SET BREAKPOINT etc.

Start without output allowed: Yes or No

In the case of "Start without output allowed"

(SIM mode), the mode in which a program can be tested without switching through the output channels is enabled. The relays or output transistors remain disabled, but inputs are active.

External RUN/STOP mode allowed: Yes or No

If "External RUN/STOP mode" is set, the PLC is STARTED and ABORTED (STOP) via a connected computer.

System reaction after occurrence of an error in a remote I/O line

The error number (E..) is output on the coupler 07 BR 60 of the affected line. The relationship between the "Configure system reactions" menu (see previous page) and the columns in the table below is as follows:

- Message/Stop = 0 -> "Stop" selected
- Message/Stop = 1 -> "Message" selected
- (1) -> Error in remote I/O coupler module ...
- (2) -> Error in remote I/O config. ...
- (3) -> Error in remote substation ...

The error/status information of the couplers is generally entered in MW 4104,00 ... MW 4109,15.

Message/Stop			Operating state of line in case of error with error indication E.. on 07 BR 60 / State of 07 BR 60	Operat- ing state of ZE	Error display of ZE	M 125,0 0-> no error 1-> error
(1)	(2)	(3)				
1	0	0	always STOP	RUN	yes	1
1	1	0	only in case of E7: State = RUN,	RUN	no	1
			otherwise STOP		yes	
1	0	1	in case of E1, E2, E5, E6, E8: State = RUN,	RUN	no	0
			otherwise STOP		yes	
1	1	1	in case of E1, E2, E5, E6, E7, E8: State = RUN,	RUN	no	0
			otherwise STOP		yes	
0	0	0	always STOP	STOP	yes	1
0	1	0	only in case of E7: State = RUN,	RUN	no	1
			otherwise STOP	STOP	yes	1
0	0	1	in case of E1, E2, E5, E6, E8: State = RUN,	RUN	no	0
			otherwise STOP	STOP	yes	1
0	1	1	in case of E1, E2, E5, E6, E7, E8: State = RUN,	RUN	no	0
			otherwise STOP	STOP	yes	1

3.2.5 Read FB (Function blocks)

This function serves to expand the function block library.

Once you have called this function, 907 PC 332 prompts the file name: e.g. NEW.FB. Only files with the "FB" extension are allowed.

Once you have entered the file name, the new function blocks (FBxxx) are added to the function block library and can then be used in the IL.

Note:

907 PC 332 already contains the function blocks of 907 PB 360/61/62. Therefore function 'Read FB' is not necessary (see 3.2.6).

3.2.6 Include block library expansions in 907 PC 332

The additional CEs of the block library expansions 907 PB 360/61/62 (*.BIB) have to be adopted with the data adoption program T200_DA.BAT.

Procedure in case of 907 PB 361:

Presumption: 907 PC 332 has been installed under the path ABB-SPS.

Copy the 907 PB 361 files *.BIB of 907 PB 361 onto the hard disk:

```
COPY A:*.BIB \ABB-SPS\T200\BIB <Enter key>
```

Call T200_DA.BAT under \ABB-SPS\T200:

```
CD \ABB-SPS\T200 <Enter key>
```

```
T200_DA <Enter key>
```

Select option *Libraries*. Press the <Enter key>.

Specify as *Library*:

```
\ABB-SPS\T200\BIB\PB1 <Enter key>
```

Specify under *Acceptance in*

```
\ABB-SPS\T200\BIB\PB361 <Enter key>
```

Press <F1>. Data is being adopted.

Quit the data adoption program via

```
<Esc> and select
```

```
menu option Abort
```

```
Press the <Enter key>
```

The block library expansion has been transformed in a form which can be read by 907 PC 332. Now it has to be included in the T200 library. Call 907 PC 332 again:

```
T200 <Enter key>
```

Select the option *Library* in the main menu. Then select menu option *Read manuf. library* (Read manufacturer library). Press the <Enter key>. *BIB* appears. Enter

```
PB361 <Enter key>
```

Thereafter the CEs of 907 PB 361 are included in the T200 library.

Note:

Following specifications apply for the block library expansions:

```
907 PB 360 -> PB0 } Specify in the data adoption
907 PB 361 -> PB1 } program
907 PB 362 -> PB2 }
```

As of 907 PB 360, 907 PB 361, 907 PB 362 indexed each, the data adoption is not necessary.

3.2.7 Display FB (Function blocks)

You can use this function to request a list of the function blocks available in the programming system. You can print out the list on a connected printer by entering PRN or you can output the list to a file by specifying a file name instead of PRN.

Example:

After you select the menu option, the programming system prompts you for the output file:

```
Enter: PRN for output to a printer
       FB.TXT for example, for output to the file
       FB.TXT
```

Content of the file, e.g.:

```
+
-
*
:
FB 4
FB 5
FB 15
FB 16
FB 20
FB 21
FB 22
FB 23
FB 24
```

3.2.8 Create PLC code

Translate to control code

This function results in OFFLINE translation of the project to control code. In doing so, a check is made for syntactic errors in the program and for agreement between the I/O variables used in the program and the system configuration.

For EPROM programming and generation of an Intel-Hex file, the project must be translated to control code beforehand by means of this function.

4 Printing the system configuration

(Main menu option *Print 2* -> *System Config.*)

This function allows you to print the configuration of the programming interface, the system configuration, the flag configuration and the system reaction set in the

Config. PLC menu or possibly read back from the system. The set parameters are identified by >><<.

ABB 07 ZE 60	System configuration printing	EXAMPLE
Print parameters		
Print with cover sheet (Y/N): Y	First page: 1	
Print destin.: PRN		
Also print cover sheet (Y/N)		
<F1>Store and print parameters	<F2>Store parameters	<ESC>Abort

Explanation of the parameters:

- Print with cover sheet: (Y/N): Here, you specify whether or not you wish to include the cover sheet in the print-out.
- First page: Page number of the page printed first. All further page numbers are each incremented by one.
- Print destination: Device to which you wish to make the output, e.g. printer (PRN), through V24 (COM 1) or to a file (filename.ext).

Example of a printout (without cover sheet):

ABB 07 ZE 60	Programming interface configuration	EXAMPLE
>>Local ZE<<	Interface parameters	Remote ZE

>>Local ZE<<	Interface parameters	Remote ZE
--------------	----------------------	-----------

```

Channel      : >>COM1<< COM2
Baud rate    : 300 600 1200 2400 4800 9600 >>19200<<
Data bits    : >>7<< 8
Stop bits    : >>1<< 2
Parity       : none odd. >>even<<
    
```

L 00	00	01	02	03	04	05	06	07	08	09	Modules
GPT											
EW	BE 60			BE 61			BE 62				E16 E32 E64 A16 A32 A64 EA16 EA32 EW4 EW8 AW4 AW8 EAW4 EAW8 BR60 ZB60 ZB69 EI60 KP60 KP6X IR60 CS61 CS6B BA16 BA32 BA64 CLR
1.EW		AW4		EW8	AW8						
2.EW											
3.EW											
4.EW											
5.EW											

L 01	00	01	02	03	04	05	06	07	08	09	Baugruppen
0.UST											
1.UST											E16 E32 E64 A16 A32 A64 EA16 EA32 EW4 EW8 AW4 AW8 EAW4 EAW8 BR60 ZB60 ZB69 EI60 KP60 KP6X IR60 CS61 CS6B BA16 BA32 BA64 CLR
2.UST											
3.UST											
4.UST											
5.UST											
6.UST											
7.UST											
8.UST											
9.UST											

ABB 07 ZE 60

Configuration of remote I/O expansions

EXAMPLE

L 02	00	01	02	03	04	05	06	07	08	09	Modules
0.UST											
1.UST											E16 E32 E64
2.UST											A16 A32 A64 EA16 EA32
3.UST											EW4 EW8 AW4 AW8
4.UST											EAW4 EAW8 BR60
5.UST											ZB60 ZB69 EI60
6.UST											KP60 KP6X IR60
7.UST											CS61 CS6B BA16 BA32 BA64
8.UST											CLR
9.UST											

ABB 07 ZE 60

Configuration of remote I/O expansions

EXAMPLE

L 03	00	01	02	03	04	05	06	07	08	09	Modules
0.UST											
1.UST											E16 E32 E64
2.UST											A16 A32 A64 EA16 EA32
3.UST											EW4 EW8 AW4 AW8
4.UST											EAW4 EAW8 BR60
5.UST											ZB60 ZB69 EI60
6.UST											KP60 KP6X IR60
7.UST											CS61 CS6B BA16 BA32 BA64
8.UST											CLR
9.UST											

ABB 07 ZE 60

Configuration of remote I/O expansions

EXAMPLE

L 04	00	01	02	03	04	05	06	07	08	09	Modules
0.UST											
1.UST											E16 E32 E64
2.UST											A16 A32 A64 EA16 EA32
3.UST											EW4 EW8 AW4 AW8
4.UST											EAW4 EAW8 BR60
5.UST											ZB60 ZB69 EI60
6.UST											KP60 KP6X IR60
7.UST											CS61 CS6B BA16 BA32 BA64
8.UST											CLR
9.UST											

Buffered variable areas	
Range for bit flags	: M
Range for word flags	: MW
Range for step	: S
Range for timer	: T
Range for counter	: Z

Coupler area	
Range for coupler 1	: AW'
Range for coupler 2	: AW'

Ext. Start input _____	: E
Cycle monitoring time (msec) _____	: 250
Error in centr. I/O configuration; ZE _____	: >>Message<< Stop
Error in centr. I/O expansion; ZE _____	: >>Message<< Stop
Error in remote I/O coupler module; ZE _____	: >>Message<< Stop
Error in remote I/O config.; transmission _____	: >>Message<< Stop
Error in remote substation; transmission _____	: >>Message<< Stop
Debug access permission _____	: >>Yes<< No
Start without output allowed _____	: >>Yes<< No
External RUN/STOP mode allowed _____	: >>Yes<< No

5 Communication with the PLC from the main menu (Main menu option *PLC Commun.*)

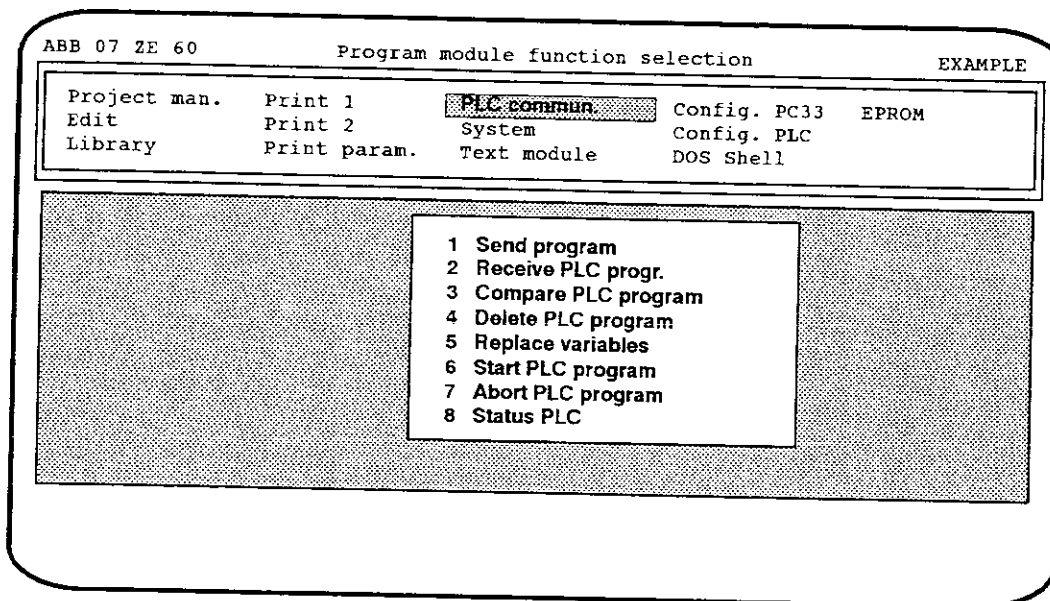
IMPORTANT:

Depending on the nature of the ONLINE functions, these have a direct influence on the PLC program and/or the I/O signals and thus on the process. Therefore, in all cases before running the function, make sure that personal injury and machine damage are impossible!

907 PC 332 provides a series of functions for commissioning and checking the PLC program. These include the main menu option *PLC Commun.* and the ONLINE functions that can be called in the FBD/LD editor, extended IL and the variable editor in a menu. To do this, your PC's serial interface must be connected to the PLC's serial interface with the cable 07 SK 61 R1 (25-pole) or 07 SK 62 R1 (9-pole). You will find a further description of these cables in the system description of the ABB Procontic T200, Section 2 – Hardware.

5.1 PLC communication

When you call the *PLC Commun.* menu option, the programming system shows the following display:



1 Send program

When you select the *Send program* option, the PLC program existing in the form of an instruction list is transferred.

The function Send Program is enabled when the PLC program is in the

- status "RUNNING"
- or in the
- status "ABORTED".

When the status is "ABORTED" you are prompted to specify whether or not you first of all wish to delete the program in the PLC. After transfer, the program can be started in the PLC.

See also the table in chapter 7.

2 Receive PLC program

When you select the *Receive PLC program* option, the program is read out of the PLC and is stored in the programming system.

Before the program is read out of the PLC, the system prompts you to enter the project name under which you wish to store the project.

However, the program read back cannot be stored in a project that already exists.

If the symbol file (variable list) is too large for a program module, 907 PC 332 automatically modularizes the program that has been read back. Program modules are created. The program modules' names consist of the previously specified project name and two digits.

The structure of the project that has been read back can be different from the original project, that has been sent to PLC. The size of the PMs can differ. Variable modules won't be created.

Check the programm modules that have been read back for completed bracket and Goto commands for eliminating error messages when translating later on.

3 Compare PLC program

When you select the *Compare PLC program* option, the program is read out of the PLC and is compared to the current program stored in the programming system.

In the case of modularized projects, the program is compared module-by-module. The modules are compared in the order in which they are listed in the modularization editor.

Once the program has been read out of the PLC, all instructions are checked for differences. Along with details of the word number, the system displays whether the command, operand or operand number differs.

The program comparison can be aborted (by pressing <Esc>) after every difference found. Press the <Enter key> whenever you wish to display the next error. The number of differences found is displayed at the end.

4 Delete PLC program

You can delete the program in the PLC by selecting the *Delete PLC program* option.

5 Replace variables

Using this function, individual variables or ranges of variables can be edited in a short time in a program module without having to use the variable editor. A window is opened when you call this function. You enter the start, end and destination variables in this window. It is possible to replace variables of the same type by means of this function. It is not possible to replace constants with this function. If you wish to edit or replace constants, you must map them to flags.

The replacement of double word variables and operands of the type E is not supported. For these cases replace the variable areas in the variable editor and send the complete program to the PLC.

6 Start PLC program

The program cycle in the PLC is started. The PLC is started and changes to the "RUN" mode. If an error occurs in doing so, it is displayed on the 7-segment display of the central station or you can inform yourself about the state of the PLC in "Status PLC".

Any occurring error must first of all be acknowledged with "Abort PLC program" before the PLC can be restarted.

7 Abort PLC program

The program cycle in the PLC is aborted.

Note:

The operating mode selector switch must be set to REMOTE in order to select *Start PLC program* and *Abort PLC program*.

8 Status PLC

E.CODE	00
CPU	on
HALT	off
SIMULATION	off
ERROR	off
FORCED	off
DEBUG	off

E.CODE xx: The central unit (ZE) has reported an error (xx = error code), which is simultaneously displayed on the CPU's 7-segment display. Refer to the system description of the ABB Procontic T200 hardware, Chapter 5.5, Error lists, for a description of this error message's meaning.

CPU: off = stop, on = running

HALT: CPU in "HALT" mode, after the 'Stop' command

SIMULATION: CPU is started without active outputs

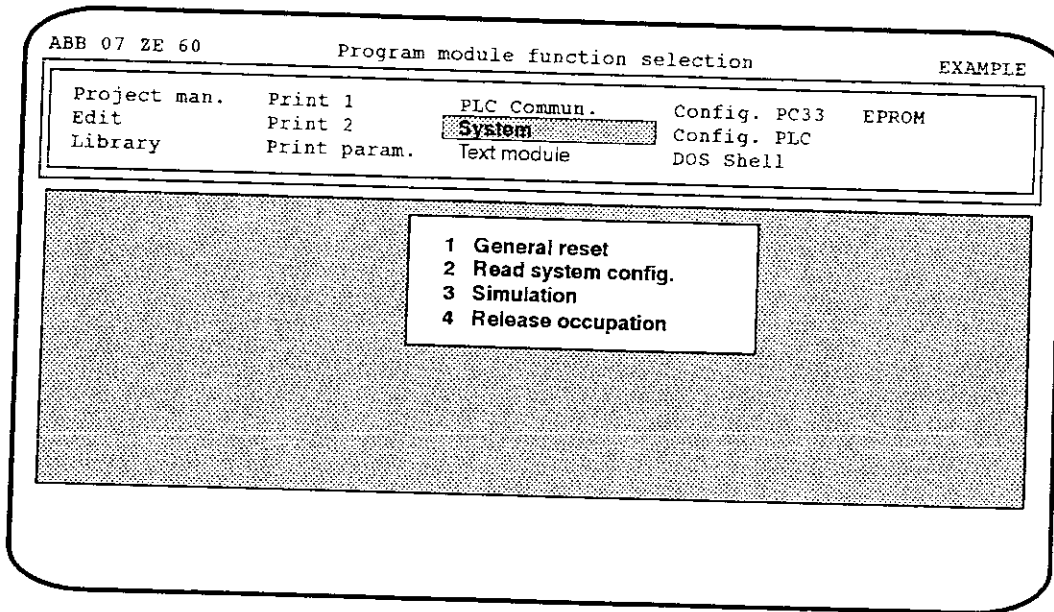
ERROR: An error has occurred that is displayed on the 7-segment display of the central unit (ZE) and as E.CODE xx. Refer to the system description of the ABB T200 Procontic Hardware, Chapter 5.5, Error lists, for a description of this error message's meaning.

FORCED: Variables are "forced"

DEBUG: on = the central unit (ZE) is in DEBUG mode. Either a break point or the single cycle mode is active.

6 System functions

(Main menu option *System*)



1 General reset

This function completely clears the contents of the central unit. Reset is necessary before commissioning a new memory module (PS/PR) for the first time. Before calling this function, you must make sure that the programming and test system 907 PC 33 (PC) is connected to the own central unit.

This function may not be called when 907 PC 332 is connected via the communication processor 07 KP 60 or via another central unit using network ZB20 as otherwise communication is interrupted and cannot be established anymore.

2 Read system config.

The system configuration (installed devices, subracks etc.) is detected and entered in the configuration file project_name.SKF.
In the case of decentralized systems, only the configuration of the basic subrack is read.

3 Simulation

This function sets or resets operation without output (SIM). You can only switch from "Operation without output" to normal operation and vice versa in the "Aborted" mode. Program execution is aborted when you switch in RUN mode.

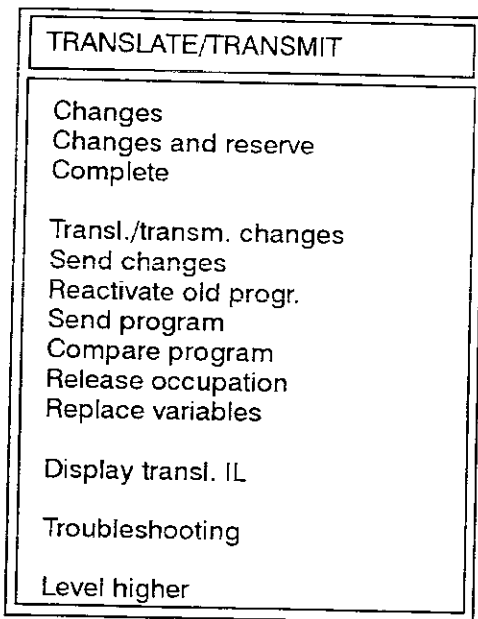
Operation without output is indicated by the SIM LED on the central unit.

4 Release occupation

Access to the programming interface of a central unit can be refused. This is the case, for example, when a station (programming or display device) does not cancel the occupation status (release occupation) after a communication. In this case, access to the central unit can be enabled by calling this function. Communication with other stations connected to the central unit is deactivated at the same time.

7 PLC communication from FBD/LD and extended IL

In addition to PLC communication directly from the main menu interface, it is also possible to communicate with the PLC from the FBD/LD or the extended IL. When you press the space bar or the right mouse button, a window containing a list of the functions available in the FBD/LD or in the extended IL is opened. The following window appears after you select the *TRANSLATE/TRANSMIT* function: here, it is possible to translate and send program changes.



Note on how to carry out changes in a program:
If changes are made in a program, they have to be translated and send before leaving the editor.

Furthermore, pay attention to the following:

Code reserve

You must set up a code reserve so that program changes can be sent to the PLC. When translating the FBD/LD or the extended IL, NOP instructions are appended to the end of each segment plan (segment plan reserve) or to the end of the program module (module reserve) as code reserve.

Specify the code reserve under *Config. PC33/Module configuration* in the main menu for the program module and, in the case of modularized projects, in the *Config. PC 33/Reserve conf.* option at the overall project level. The reserves shown there correspond to the default code reserve, which applies to all segment plans. When the system is delivered, it is set to a value of 50, i.e. 50 NOPs are added to the IL of each segment plan. You must modify the setting depending on the length of expected program changes.

The code reserve within a segment plan can be set by means of the @RES command. It then applies precisely to this one single segment plan. Refer to the chapters entitled 'Compiler' of the individual editors and the chapter entitled "Modularization, reserve/module configuration" in 907 PC 33/General part for further notes on how to set the code reserve.

Flag allocation

The type of flag allocation is defined on program module level under *Config. PC33/Module configuration* in the main menu. Flag allocation is preset to local flag allocation. The local flag allocation relates to one segment plan respectively.

Changes

When you select the translate changes option (*changes*), the program changes made in the FBD/LD or in the extended IL are translated. The time needed for translation is reduced because there is no need to translate the complete program. Translate *changes* can almost always be selected if a default code reserve has been defined. In the case of changes requiring translation of the complete program, the programming system issues a corresponding message.

Changes and reserve

Contrary to *Changes*, when you select 'Changes and reserve', the program changes made are translated and the reserve is computed and set again according to the setting made under *Config. PC33/Module configuration*. The complete program must be sent to the PLC after translation by means of *Changes and reserve*.

Complete

The complete program is translated when you select the *Complete* option. The reserves are computed and set according to the setting made under *Config. PC33/Module configuration* in the main menu.

Transl./transm. changes <Alt>-1

When you select the *Transl./transm. changes* option, the program changes made in the FBD/LD or in the extended IL are translated and then sent to the PLC. The time needed for translation and sending is reduced because there is no need to translate and send the complete program.

This option can only be used if the complete program has already been sent once to the PLC and program changes have then been made in the programming system. Program changes exist whenever changes have been made in the FBD/LD or in the extended IL and have been translated by selecting *Changes*.

The *Changes* function is possible if the PLC program is in the

– "RUN" state

or in the

– "ABORTED" state.

Note:

Observe the section entitled "Code reserve" and the pro-

cedure described in "Send changes", "Changes" in table 1.

Note for the execution of changes:

If you create changes in the program you have to translate and send them to the editor.

Speed up translating and sending of the program:

You have the possibility to translate the FBD/LD or the extended IL by using a quicker procedure: the "Send changes" procedure. It can only be used if the whole program has already been translated once.

The time needed for sending the translated IL to the PLC can also be reduced by using "Send changes". It can only be used if the whole program has already been translated once.

You can also transmit program changes or a complete program online, i.e. with the PLC running.

For using all possibilities, some points have to be considered, which you find in the following table.

Notes for 'Changes', 'Send changes'

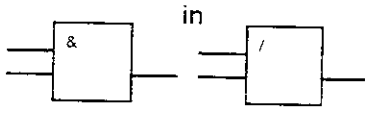
Type of change in FBD/LD or extended IL	Rules
<ul style="list-style-type: none"> • Change variables e.g. E0,0 in M0,0 • exchange CE e.g.  <ul style="list-style-type: none"> • Double CE connection • Set inversion or delete 	<p><i>Changes</i> is possible, also with changes in several segment plans. <i>Sending changes</i> is possible.</p>
<ul style="list-style-type: none"> • Add CE • Delete CE • Copy block • Read block with <CTRL-KR> (block fits in the actual SP) 	<p><i>Changes</i> is possible, also with changes in several segment plans. <i>Send changes</i> is possible, if no segment plans have been added.</p>
<ul style="list-style-type: none"> • Divide, blend, paste or add segment plan • Change the order of the segment plans • Copy SP • Paste block in already existing segment plan (with block function <Ctrl>-K-R), block does not fit in the actual SP • Read block in segment plan management • Change a variable with <CTRL-Z> 	<p><i>Changes</i> is possible, also with changes in several segment plans <i>Send changes</i> is not possible; the complete program has to be transmitted with <i>Send program</i>.</p> <p>Note for using <CTRL>-Z If you only want to look at a variable with symbol and long text, but don't want to change it, please use the key combination <CTRL>-P. 907 PC 332 knows now, that no changes have been made and doesn't demand translating. This function can also be used online.</p>
<ul style="list-style-type: none"> • Shift SP • Delete complete segment plan 	<p><i>Changes</i> is not necessary (the programming software retains the deleted segment plan and doesn't send it to PLC); you have to transmit the complete program with <i>Send program</i>.</p>
<ul style="list-style-type: none"> • Change one or more variables in the variable editor 	<p>Translating is not necessary. The whole program has to be send.</p>

Table 1: Notes for 'Changes', 'Send changes'

Send changes <Alt> -2

When you select the *Send changes* option, the program changes made in the FBD/LD or in the extended IL and translated are sent to the PLC. The time needed to send the changes is reduced because there is no need to send the complete program.

This option can only be used if the complete program has already been transferred once to the PLC and program changes have then been made in the programming system. Program changes exist whenever changes have been made in the FBD/LD or in the extended IL and have been translated by means of *Changes*.

The *Send changes* function is possible if the PLC program is in the
– "RUN" state
or in the
"ABORTED" state.

Proceeding:

First of all establish a basic state:

- Enter the program (FBD/LD editor or extended IL); in doing so, set up a code reserve in the segment plans to be changed later or a default reserve for all segment plans.
- Translate the program ("Complete")
- Send the program

Once changes have been made in the segment plans with a code reserve, translate the FBD/LD or the extended IL by means of *Changes*. You can then send these changes to the PLC by selecting *Send changes*.

During the course of compiling, 907 PC 332 ascertains which segment plans have been changed. Only these segments plans are compared to the old PLC program's code. The changes found in this case are sent to the PLC.

Note:

The time needed for translating and sending changes will be reduced by using small segment plans.

The NOPs of the code reserve are overwritten when extending a segment plan while editing. NOPs are again inserted when shortening a segment plan. When making changes, you must make sure that this is done within the specified code reserves.

Therefore, you must not select the *Send changes* option if

- a segment plan has become longer (in relation to the basic state) than can be handled by the code reserve. (This is reported by the extended IL or FBD/LD translator.) 907 PC 332 issues then the message "Module length exceeded. Please send all."
- a translation option other than "Changes" has been selected when translating the extended IL (or FBD/LD). (The "Changes and reserve" option serves to speed up translation and the complete program must be sent after this also!)
- a new program module has been inserted or deleted in modularized projects
- the order of the program modules has been modified in modularized projects

Both in 907 PC 332 and in the T200, individual variables or ranges of variables can be modified by means of the *Replace variables* function (in the *PLC Commun.* menu).

The procedure between programming system and PLC by using "Send changes" in the "PLC running" mode corresponds to the diagram in table 2. Instead of the complete program only the changed program parts will be sent.

If an error is reported by using "Send changes" or if the changes are not released, the complete program has to be sent.

Attention when transmitting in the "PLC running" mode:

If program parts are removed, which contain flags or outputs set at the moment of the change, these flags or outputs will not be reset.

Reactivate old progr. <Alt> -8

This function is only available in 07 ZE 6x R302 central stations in conjunction with a 07 PS 6x R3 memory module.

By selecting the *Reactivate old progr.* option, the PLC reverses the changes made to a *running* PLC program. In doing so, the PLC restores the program state that existed *before* transferring the changes.

You can use this command if you realize that the changes made to the *running* PLC program do not produce the desired success.

If you switch to the old program while *Reactivate old progr.* is active, variables and therefore also outputs that have been set previously by the new program are not reset.

The *Reactivate old progr.* function allows you to repeatedly switch between an old and a new PLC program.

Note:

The scope of functions described above runs exclusively in the PLC. That is to say, program changes made and archived in the programming system are not affected. You yourself must ensure that the changes are reversed in the programming system so that the program in the

PLC and the one in the programming system will agree again.

Send program <Alt> – 3

You can transfer the PLC program existing in the form of an instruction list by selecting the *Send program* option.

The *Send changes* function is possible if the PLC program is in the
– "RUN" state
or in the
"ABORTED" state.

In the "ABORTED" state, a message will be prompted, if you want to delete first the program in the PLC. After transmitting the program it can be started in the control.

See table 2.

Compare program <Alt> – 4

When you select the *Compare program* option, the program is read out of the PLC and is compared to the current program stored in the programming system.

In the case of modularized projects, the programs are compared module by module. The modules are compared in the order in which they are listed in the modularization editor.

All instructions are checked for differences once the program has been read out of the PLC. Along with details of the word number, a display appears indicating whether the command, operand or operand number differs.

You can abort the program comparison after every difference that has been found. The number of differences found is displayed at the end.

Release occupation <Alt> – 7

Access to the programming interface of a system can be refused by other programming or display units. For example, this is the case whenever a station does not cancel the seized status before clearing a connection after communication. In this case, access to the system can

be enabled by calling this function. At the same time communication with other stations connected to the system is deactivated.

Replace variables <Alt> – 9

By means of this function, individual variables or ranges of variables can be modified online in a short time in a program module without having to use the variable editor. A window is opened when you call this function. You enter the start, end and destination variables in this window. You can replace variables of the same type. You cannot replace constants with this function. Constants must be mapped to flags if they are to be modified or replaced.

The replacement of double word variables and operands of the type E is not supported. For these cases you will have to replace ranges of variables in the variable editor and send the complete program to the PLC.

Display transl. IL <Ctrl> – <F3>

The translated IL of the FBD/LD or the extended IL can be displayed with this function.

Troubleshooting <Shift> – <F6>

If errors or warnings have been reported during the translation run, each individual error in the FBD/LD or in the extended IL can be displayed with this function. The cursor then moves to the point in the FBD/LD or the extended IL that contains the error.

Notes for the following table 2

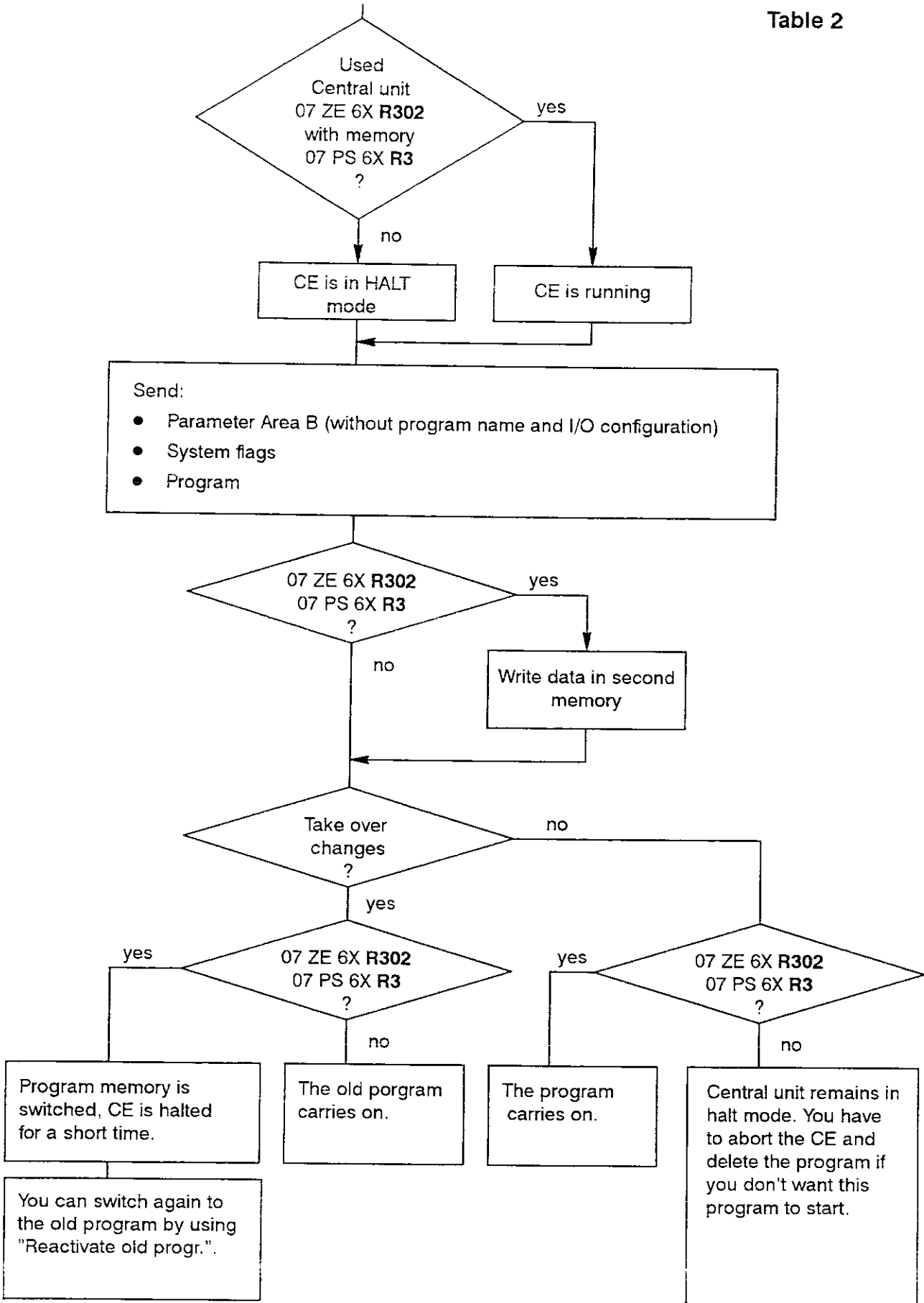
The program name will not be checked when changes are made online!

The system configuration must not be modified when changes are made online, i.e. if you want to send another project with another system configuration to the control, you will have to abort the PLC program first!

Be very careful when modifying a running PLC program. Program changes may have direct effects on the running process without having check possibilities. Programming errors may have severe consequences.

Send the complete program in the "PLC running" mode

Table 2



8 Test operation with ONLINE functions

Extensive operator control and test functions are available in Online mode to enable testing of the PLC program. These operator control and test functions can be used

- in the FBD/LD
- in the extended IL
- in the variable list
- in the online list

Additional online information such as the program status, variable status and breakpoint address etc. is also displayed.

Status information is designated or abbreviated as follows:

running Program execution is running.

Aborted Program execution has been aborted; the outputs are set to "0".

Debug PLC stopped Program execution has been stopped (program address 0); the PLC is in test mode.

Debug PLC running Program execution is running; the PLC is in test mode.

Single cycle Single cycle active

At breakpoint BP Breakpoint set. The breakpoint address, consisting of the word number (also the module number in the case of modularized projects) is displayed when a breakpoint is reached.

FO Forcing active

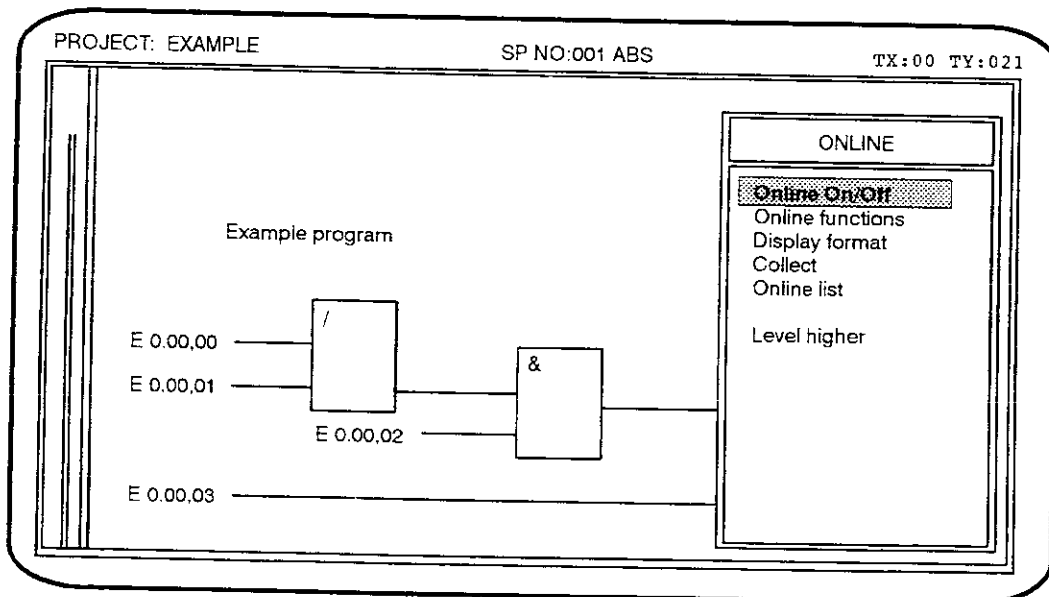
AV Status of selected variables on

Variable status Display of variable statuses

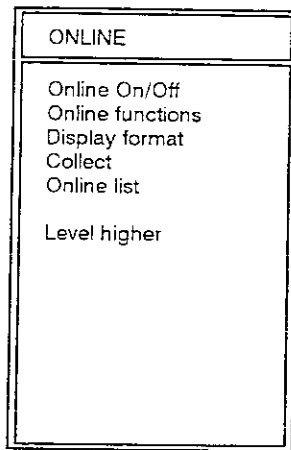
Status Var. Trig. Display of variable statuses when trigger condition met

Trigger time Display of the variables at specified intervals

Online



ONLINE



Online On/Off

Activate or deactivate online testing by selecting the *Online on/off* option. The menu appears when you press the *<Space bar>* or the *<Right mouse button>*. Press the *<Enter key>* or the *<Left mouse button>* to select the required option.

Online mode is possible:

in the function block diagram/ladder diagram

FBD/LD

in the extended instruction list (ext. IL)

in the variable list

in the online list

Online functions

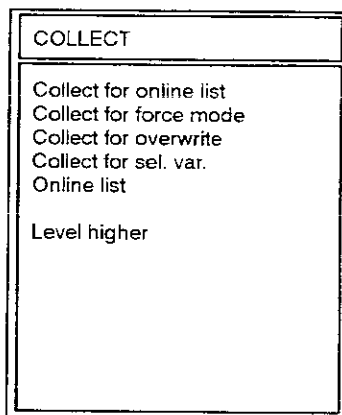
See Description as from Page 8–5

Display format

You can choose between the binary, octal, decimal and hexadecimal formats.

Collect

By means of the *COLLECT* function, individual variables can be transferred to the online list.



Collect for online list, <1>

You can collect variables in the online list by selecting the *Collect for online list* option or by pressing the hot key <1>. You must position the cursor on the corresponding variable in the FBD or the corresponding line in the extended IL before executing the function.

Collect for force mode, <3>

You can collect variables for forcing by selecting the *Collect for force mode* option or by pressing hot key <3>. You must position the cursor on the corresponding variable in the FBD or on the corresponding line in the extended IL before executing the function. The corresponding variables are entered in the online list and are marked in the column F. When you press the hot key <E> (force all), the variables entered in the online list and marked in the column F are transferred to the PLC and are forced.

Collect for overwrite, <4>

You can collect variables for overwriting by selecting the *Collect for overwrite* option or by pressing the hot key <4>. You must position the cursor on the corresponding variable in the FBD or on the corresponding line in the extended IL before executing the function. The corresponding variables are entered in the online list and are marked in the column O. When you press the hot key <R> (overwrite all), the variables entered in the online list and marked in the column O are overwritten.

Collect for selected variables, <5>

You can collect variables for the 'Display selected variables' function (*Status of selected variables on/off*) by selecting the *Collect for selected variables* option or by pressing the hot key <5>. You must position the cursor on the corresponding variable field in the FBD or on the corresponding line in the extended IL before executing the function. The corresponding variables are entered in the online list and are marked in the column D. Only the selected variables are then updated when you press the hot key <A> (*Status of selected variables on/off*).

Online list

The online list is an additional tool for displaying the status of any chosen variables and operating states of the PLC during online operation with 907 PC 332.

Variables can be entered in the online list

- by collecting
- by direct input
- by reading in a block (e.g. ONLINE or RESERR)

The variables can be marked for

- status of selected variables (column D)
- forcing (column F)
- overwriting (column O)
- block functions (column M)

Variables are marked with <F5>. You can cancel the marking by pressing <F6>.

The statuses of the operating states are mapped to internal bit and word flags (see Section 4, language description).

The following online lists are supplied along with 907 PC 332:

ONLINE1.OE
ONLINE2.OE
ONLINE3.OE
RESERR.OE

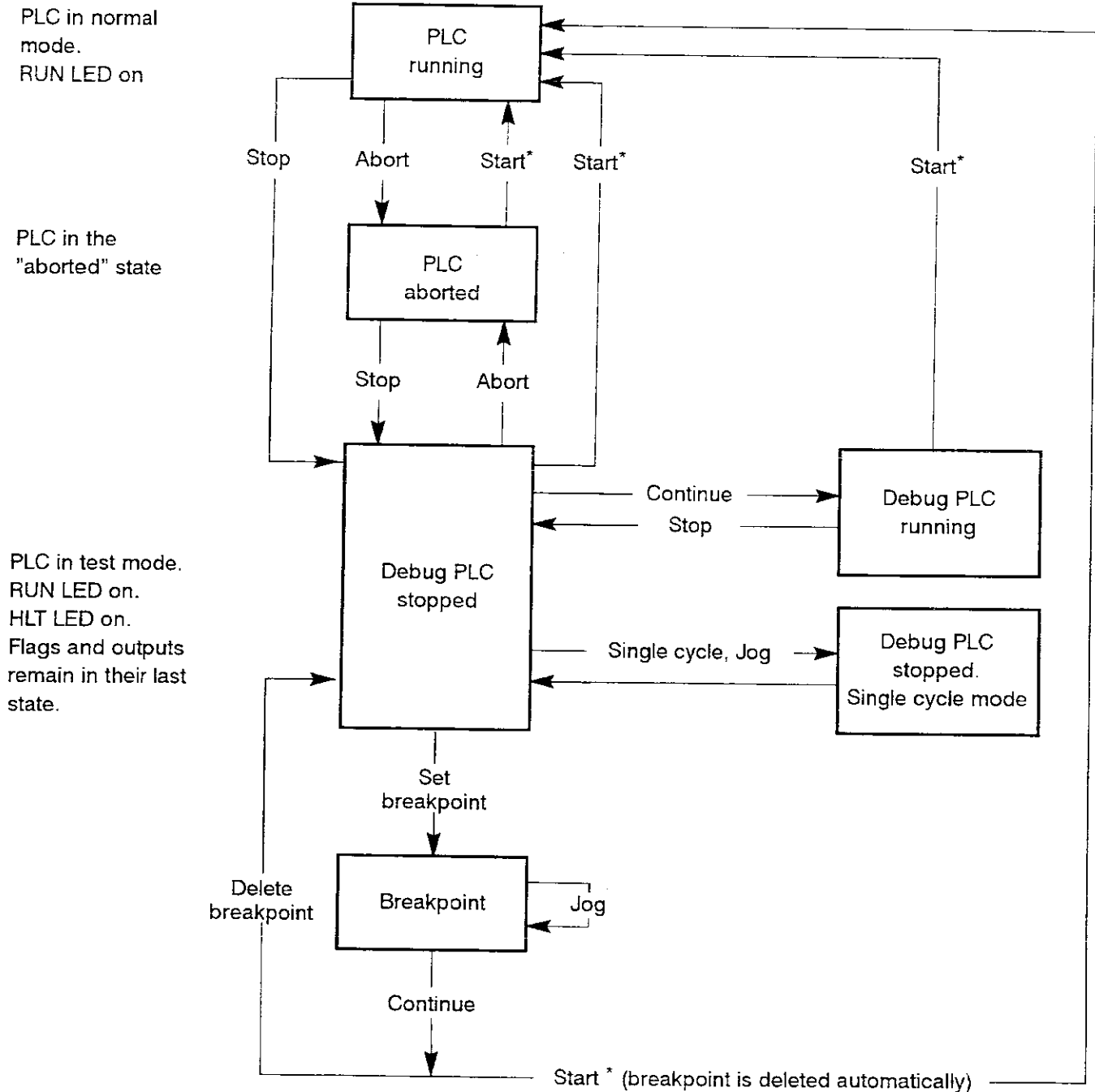
The RESERR list contains extracts from ONLINE 1...3 and is an error diagnosis tool.

The online lists can be read into the online list for the current project by means of the block read function.

Overview of operating modes

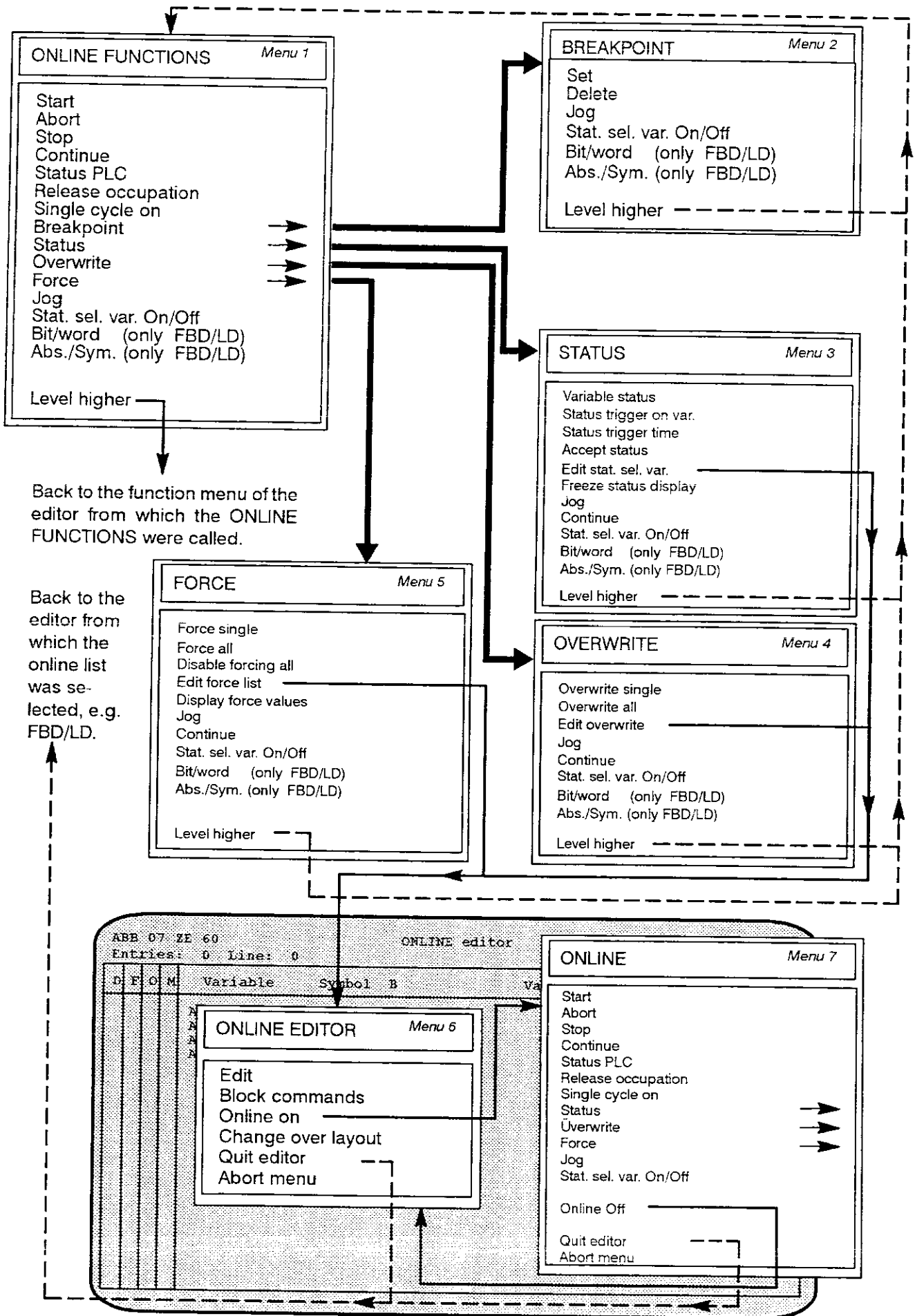
The central processing unit may be in various operating modes (see Page 5-3, 'Status PLC'). Debug is a test mode status of the PLC. It is indicated by illumination of the HLT-LEDs on the central station.

The following figure shows the relationships between the modes and how they are called or exited from 907 PC 332.



* Generally, all non-buffered areas are reset in the case of "Start".

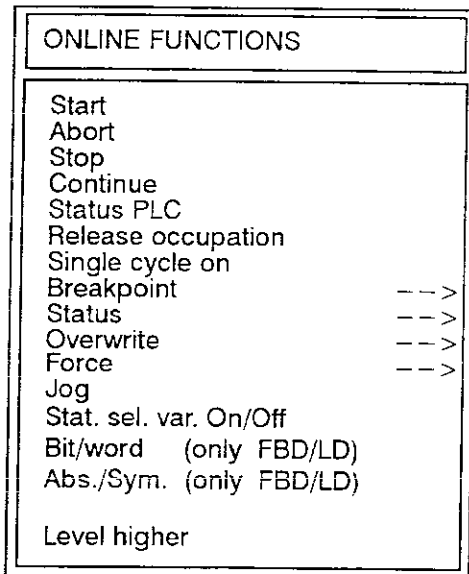
Menu overview Online functions



ONLINE functions

During online testing, you can call the required online functions by selecting the appropriate menu option.

ONLINE FUNCTIONS menu (Menu 1)



Start program, <Alt>-S

You start the PLC program by selecting the *Start* option or by pressing the hot key <Alt>-S.

The PLC is started and changes to the "RUN" mode. If an error occurs, it is displayed on the central station's 7-segment display or you can inform yourself about the status of the PLC by selecting *Status PLC*.

It is possible to start when the program is in the *Aborted* or *Stopped* state and the mode selector switch is set to REMOTE.

If an error has occurred, you must first of all acknowledge by selecting "Abort PLC" before you can restart the PLC.

Abort program, <Alt>-A

You abort the PLC program by selecting the *Abort* option or by pressing the hot key <Alt>-A.

You can only abort the program when it is in the *Running* or *Stopped* state.

Flags and timers retain their statuses and are initialized the next time you select 'Start program', provided they are not used as buffer flags.

Stop program, <Alt>-H

You stop the PLC program by selecting the *Stop* option or by pressing the hot key <Alt>-H. Execution of the user program is stopped at program address 0.

You can stop the program in the following cases:

- PLC aborted or
- PLC running and mode selector switch set to REMOTE.

After you select the *Stop* command, execution of the program is stopped at program address 0. All outputs, flags and timers are reset. "Debug PLC stopped" is displayed.

If you now continue the program (see "Continue program" function) and stop it again, all flags, outputs and timers retain their statuses and you are in debug mode.

You can quit debug mode by selecting the 'Start PLC' or 'Abort PLC' command or by actuating the mode selector switch.

Continue program, <Alt>-C

You continue the PLC program by selecting the *Continue* option or by pressing <Alt>-C. This function can only be activated in the 'Debug PLC stopped' state. Execution of the program is continued from the 'Debug PLC stopped' state (-> 'Debug PLC running').

Status PLC, <I>

see Page 5-3, *Status PLC*

Release occupation, <Alt>-7

see Page 6-1, *Release occupation*

Single cycle on, <Z>

You activate the single cycle mode by selecting the *Single cycle* option or by pressing the hot key <Z>. This mode is activated from the 'Debug PLC stopped' state. Execution of the program is stopped at address 0. Outputs and flags remain unchanged.

907 PC 332 then prompts a number of cycles that are to be executed up to the next stop. This function is executed immediately after you press the <Enter key>.

You can select 'Jog' (<G>) to repeat execution of the program for the set number of program cycles. Selecting 'Continue' (<Alt>-C) clears single cycle mode and the PLC continues to run ('Debug PLC running').

'Stop' clears the single cycle and the PLC is in the 'Debug PLC stopped' state.

'Start' clears the single cycle; the PLC runs. The Debug mode is deactivated.

Breakpoint

In breakpoint mode, you can specifically interrupt execution of the user program at a point in the program where a breakpoint is set. You can only ever enter one breakpoint. Breakpoint mode is activated from the 'Debug PLC stopped' state.

It is possible to couple single cycle mode with breakpoint mode. Two breakpoints can then be used:

Single cycle Address 0000

Breakpoint Address xxxx

The following submenu appears when you select the *Breakpoint* option:

BREAKPOINT menu (Menu 2)

BREAKPOINT	
Set	
Delete	
Jog	
Stat. sel. var. On/Off	
Bit/word	(only FBD/LD)
Abs./Sym.	(only FBD/LD)
Level higher	

Set Breakpoint,

Before doing this, in the extended IL you must position the cursor on the corresponding line or, in the FBD/LD, on the corresponding variable where you wish to set the breakpoint.

You can set a breakpoint by selecting the Set option or by pressing the hot key .

An input window appears:

B	M	Mod	Addr	Comment
*		001	0005	

By pressing the <Enter key>, you confirm the display and the breakpoint immediately takes effect in the PLC. Pressing the <ESC> key cancels the setting. No breakpoint takes effect.

The breakpoint can also be entered while the PLC program is running.

In the case of *modularized* projects, the word number displayed in the window always refers to the *Start* of the respective *Module*.

After you have set a breakpoint, the program is stopped at this address after each 'Jog'. Execution of the program is continued (debug PLC running) after the breakpoint has been cleared (<Alt>-B) and by means of 'Continue' (<Alt>-C).

Delete Breakpoint, <Alt>-B

You can delete the set breakpoint, i.e. deactivate in the PLC, by selecting the *delete* option or by pressing the hot key combination <Alt>-B. The PLC is then in the 'Debug PLC stopped' state. Before selecting *Delete* or pressing <Alt>-B, you must move the cursor to the corresponding variable or line. The input window displayed before then appears. Press the <Enter key> to confirm your input, after which the breakpoint will immediately become inactive in the PLC. You can cancel inputs by pressing the <ESC key>. The breakpoint will then remain set.

Jog, <G>

This command is only effective in 'Single cycle' mode or when a breakpoint is set.

When you select the *Jog* option or press the hot key <G>

- in single cycle mode, the program is run through in the specified number of single cycles
- if a breakpoint is set, the program is run once after the breakpoint.

Status of selected variables On/Off, <A>

When you select the *Status of selected variables On/Off* option or when you press the hot key <A>, only the status values of the variables you have selected are updated on the screen. Select variables by entering them in the online list and by marking them in the column D. The statuses of all other variables are no longer updated.

When you select the *Status of selected variables on/off* option or you press the hot key <A> again, this mode is deactivated again and the statuses of *all* variables are updated on the screen.

Bit/Word (only FBD/LD), <X>

When you select the *Bit/word (in FBD/LD only)* option or when you press the hot key <X>, the status display for *Word variables* is toggled between the two forms of representation binary and word value.

Binary form of representation:

- in the FBD/LD, the variable name is highlighted visually if the value is *unequal to zero*

Word value form of representation:

- in the FBD/LD, the value of the word variable is displayed instead of the variable name.

Absolute/Symbolic (only FBD/LD), <F9>

When you select the *Absolute/symbolic (only FBD/LD)* option or when you press the <F9> key, the status display is toggled between the two forms of representation absolute and symbolic; that is to say either the absolute or the symbolic designations are shown for the variables.

Level higher

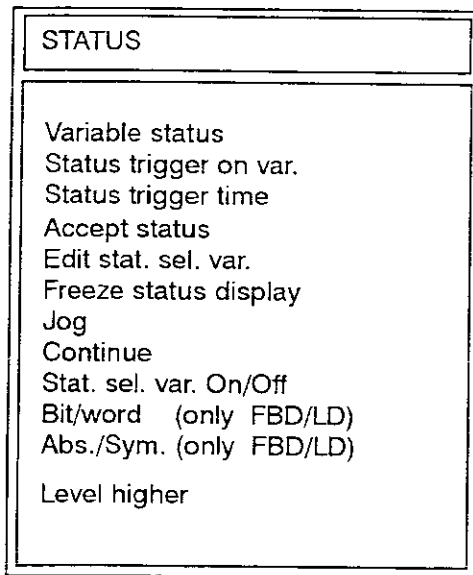
When you select the Level higher option, you are returned to the ONLINE FUNCTIONS menu.

Status

The programming system provides various possibilities of displaying the statuses of variables.

The following submenu is called when you select the Status option:

STATUS menu (Menu 3)



Variable status, <V>

When you select the *Variable status* option or when you press the hot key <V>, the status of the variables is displayed cyclically. This cancels any previously set display modes such as *Status trigger time*.

Status trigger on variable, <T>

When you select the *Status trigger on variable* option or when you press the hot key <T>, the programming system expects you to enter a *Trigger variable* and the required *Trigger condition*. You must specify the trigger variable as an absolute variable.

The variable statuses are only ever updated on the screen when the trigger condition is met.

The following trigger conditions are possible:

Bit quantities:	Status:	" 0 "
	Status:	" 1 "
	Rising edge:	" / "
	falling edge:	" \ "
Word quantities:	more than:	" > value "
	less than:	" < value "
	equal to:	" = value "

Status trigger time, <Alt>-M

When you select the *Status trigger time* option or when you press the hot key <Alt>-M, the status of the variables is polled by the PLC at predefined intervals and the display on the screen is updated.

You specify the polling time in *milliseconds*.

Accept status, <6>

When you select the *Accept status* option or when you press the hot key <6>, you can save a momentary record of the variable statuses displayed in ONLINE mode to the online list. You can then process this information further at a later time, e.g. you can save it on the hard disk.

The momentary record of the variable statuses is produced at the time when the ONLINE functions menu is called. The variable statuses can also be saved with the block functions.

Enter status of selected variables, <O>
(Enter online list)

You call the editor for editing the online list by selecting the *Enter status of selected variables* option or by pressing the hot key <O>.

The programming system shows the following display:

ABB 07 ZE 60				ONLINE editor			EXAMPLE		
Entries: 0				Line: 0			Marked:D:0 F:0 O:0		
D	F	O	M	Variable	Symbol	B	Value	Long text	
*				A 0.00,00		B 0			
				A 0.01,00		B 0			

Here, the online list is used to display status values of selected variables in the program (FBD/LD, extended IL; column D).

Method:

Move the cursor to column D. Press <F5> to mark the required variable. Then, only the status values of the *marked* variables will be shown on the online status displays in FBD/LD or IL. You can remove the marking again by pressing <F6>.

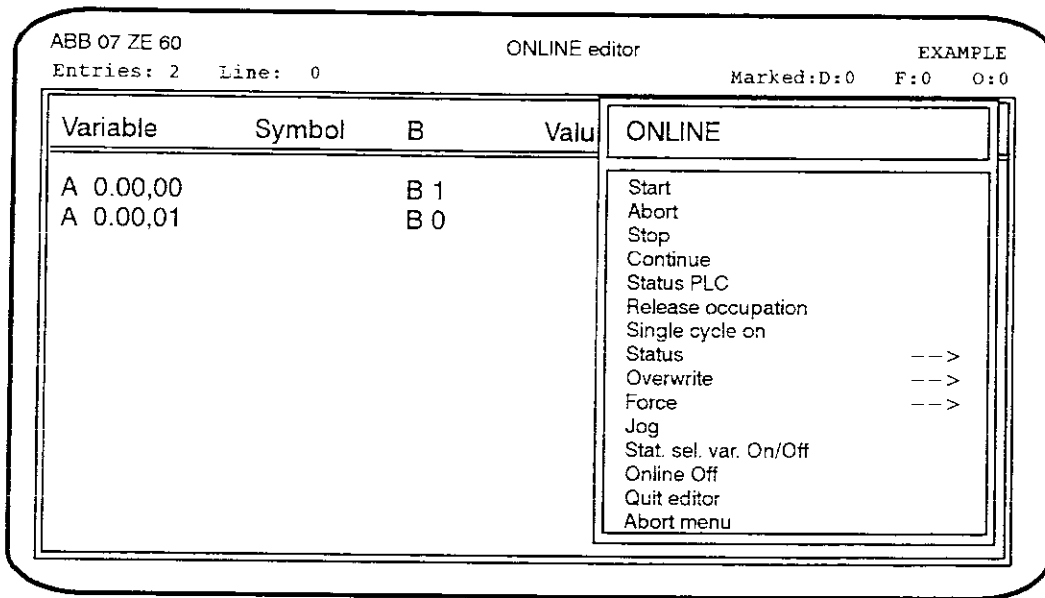
You can call the ONLINE EDITOR menu by pressing the <Space bar> within the editor for editing the online list.

ONLINE-EDITOR menu (Menu 6)

ONLINE EDITOR
Edit Block commands ONLINE on Change over layout Quit editor Abort menu

Online On

The programming system shows the following display when you select the *Online on* option and then press the *<Space bar>*:



The programming system now communicates with the PLC. The status values of the variables are displayed and the online functions are available.

STATUS menu continued (Menu 3)

Freeze status display, <0> (zero)

When you call this menu, the current variable statuses are frozen on the screen and, in the *Accept status* menu, you can decide whether or not you wish to accept this status in the online list.

Jog, <G>

This command is only effective in 'Single cycle' mode or when a breakpoint is set.

When you select the Jog option or press the hot key <G>

- in single cycle mode, the program is run through in the specified number of cycles
- when a breakpoint is set, the program is run once up to the breakpoint.

Continue program, <Alt> -C

The PLC program is continued when you select the *Continue* option or when you enter the command <Alt> -C. This function can only be activated from the 'Debug PLC stopped' state. Continue running the program from the 'Debug PLC stopped' state (-> 'Debug PLC running').

Status of selected variables On/Off, <A>

When you select the *Stat. sel. var. On/Off* option or when you press the hot key <A>, only the status values of the variables you have selected are updated on the screen. You select variables by entering them in the online list and by marking them in the column D. The statuses of all other variables are no longer updated. You can cancel this mode by once again selecting the *Stat. sel. var. On/Off* option or by pressing the hot key <A> and the statuses of all variables are updated on the screen.

Bit/word (only FBD/LD), <X>

When you select the *Bit/word (only FBD/LD)* option or when you press the hot key <X>, the status display for *Word variables* is switched over between the two forms of representation binary and word value.

Binary form of representation:

- in the FBD/LD, the variable name is highlighted visually if the value is unequal to zero

Word value form of representation:

- in the FBD/LD, the value of the word variable is displayed instead of the variable name

Absolute/Symbolic (only FBD/LD), <F9>

When you select the *Absolute/symbolic (only FBD/LD)* option or when you press the <F9> key, the status display is toggled between the absolute and symbolic forms of representation, i.e. for the variables either the *absolute* or the *symbolic* designations are shown.

Level higher

You are returned to the ONLINE FUNCTIONS menu when you select the *Level higher* option.

Overwrite

The overwrite function allows you to overwrite variables in the PLC with preset values. These values remain stored until new values are again assigned to these variables by the PLC program, by the process or by the user. Overwriting is possible both when the program is running and when it is aborted.

Overwriting is possible for the following operands:

- Flags: M, M', MW, MW', MD, MD'
- Inputs: E, EW
- Outputs: A, AW
- Steps: S
(only setting possible; by definition, resetting is only possible by setting another step)

Overwriting method:

Several variables simultaneously:

- Enter the name of the variables you wish to overwrite and of the required value(s) in the online list after selecting the *Edit overwrite* option;
- variables in the PLC are overwritten by selecting the *Overwrite all* option or by pressing the hot key <R>. This applies to all variables marked appropriately in the online list.

Overwriting individual variables:

- To overwrite one single variable in the PLC, select the *Overwrite single* option or press the hot key <U>.

When are variables overwritten?

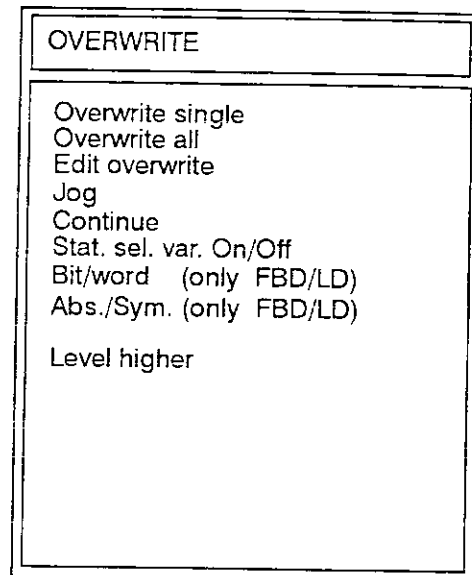
Program running:

- Variables are overwritten immediately after this has been enabled, even within the cycle.

Program stop:

- e.g. at breakpoint or in single cycle mode; variables are overwritten immediately and this takes effect immediately.

OVERWRITE menu (Menu 4)



Overwrite single, <U>

You can overwrite one single variable in the PLC by selecting the *Overwrite single* option or by pressing the hot key <U>.

Beforehand, you must position the cursor on the corresponding line in the extended IL or on the corresponding variable in the FBD/LD.

The following input window appears when you select the *Overwrite single* option or when you press the hot key <U>.

D	F	O	M	Variable	Symbol	B	Value	Long
		*		A 0.00,00			B 0	

Press the <Enter key> to confirm the display and for the overwrite value to take effect immediately in the PLC. You can cancel by pressing the <ESC key>. In this case, no overwrite value becomes active.

Overwrite all, <R>

When you select the *Overwrite all* option or when you press the hot key <R>, it is possible to overwrite variables in the PLC with preset values. These values are retained until other values are again assigned to these variables by the PLC program.

For you to be able to call the *Overwrite all* option or press the hot key <R>, you must enter the variables to be overwritten and the affiliated values in the online list and you must mark them in the column O.

Edit overwrite, <O>
(Enter online list)

Call the editor to edit the online list by selecting the Enter overwrite list option or by pressing the hot key <O>.

The programming system shows the following display:

ABB 07 ZE 60 ONLINE editor EXAMPLE
Entries: 0 Line: 0 Marked:D:0 F:0 O:0

D	F	O	M	Variable	Symbol	B	Value	Long text
		*		A 0.00,00		B 0		
				A 0.00,01		B 0		

Here, the online list is used to overwrite status values of variables in the PLC (column O).

Method:

Move the cursor to the column O. Mark the required variable by pressing <F5>. If you select 'Overwrite all', only the status values of the marked variables will then be overwritten. You can clear the marking again by pressing <F6>.

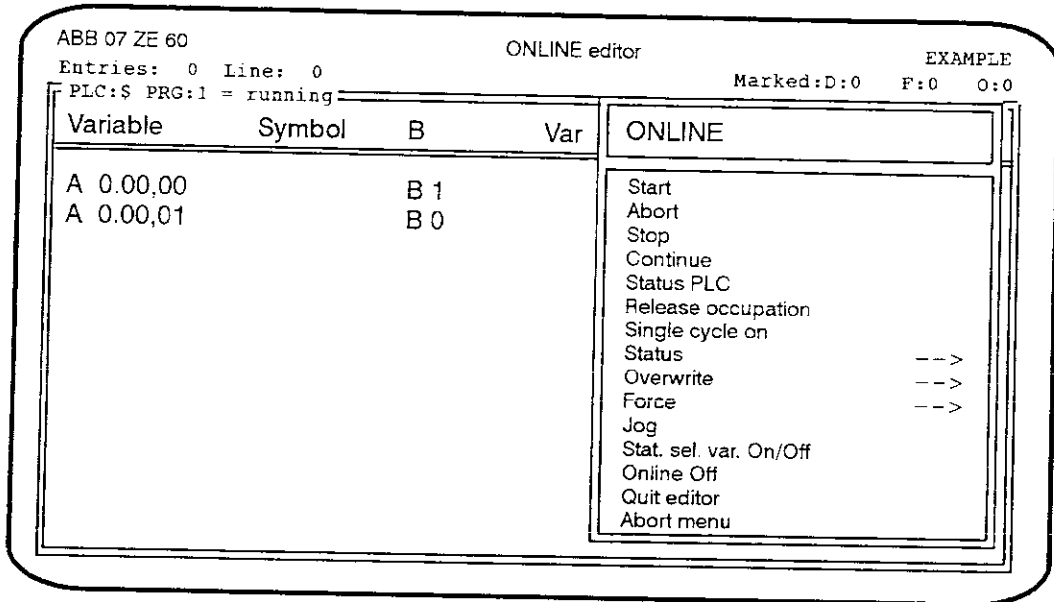
Within the editor for editing the online list, you can call the ONLINE EDITOR menu (by pressing the <Space bar>).

ONLINE EDITOR menu (Menu 6)

ONLINE EDITOR
Edit
Block commands
Online on
Change over layout
Quit editor
Abort menu

Online On

The programming system shows the following display when you select the *Online on* option:



The programming system now communicates with the PLC. The status values of the variables are displayed and the online functions are available.

OVERWRITE menu continued (Menu 4)

Jog, <G>

This command is only effective in 'Single cycle' mode or when a breakpoint is set.

When you select the *Jog* option or press the hot key <G>

- in single cycle mode, the program is run through in the specified number of cycles
- when a breakpoint is set, the program is run once up to the breakpoint.

Continue program, <Alt>-C

The PLC program is continued when you select the *Continue* option or when you enter the command <Alt>-C. This function can only be activated from the 'Debug PLC stopped' state. Continue running the program from the 'Debug PLC stopped' state (-> 'Debug PLC running').

Status of selected variables On/Off, <A>

When you select the *Stat. sel. var. On/Off* option or when you press the hot key <A>, only the status values of the variables you have selected are updated on the screen. You select variables by entering them in the online list and by marking them in the column D (by pressing <F5>). The statuses of all other variables are no longer updated.

You can cancel this mode by once again selecting the *Stat. sel. var. On/Off* option or by pressing the hot key <A> and the statuses of all variables are updated on the screen.

Bit/Word (only FBD/LD), <X>

When you select the *Bit/word (only FBD/LD)* option or when you press the hot key <X>, the status display for Word variables is switched over between the two forms of representation binary and word value.

Binary form of representation:

- in the FBD/LD, the variable name is highlighted visually if the value is unequal to zero.

Word value form of representation:

- in the FBD/LD, the value of the word variable is displayed instead of the variable name.

Absolute/Symbolic (only FBD/LD), <F9>

When you select the *Abs./Sym. (only FBD/LD)* option or when you press the <F9> key, the status display is toggled between the absolute and symbolic forms of representation, i.e. for the variables either the *absolute* or the *symbolic* designations are shown.

Level higher

You are returned to the ONLINE FUNCTIONS menu when you select the *Level higher* option.

Forcing

When forcing, you can specify fixed values for inputs, outputs and flags. They assume these values regardless of the PLC program's allocation conditions and remain effective until you modify them again or until you cancel forcing again.

During commissioning, this PLC capability can be helpful whenever not all real process inputs or outputs are available yet.

Provided a battery is installed, the FORCE values are stored in a power failsafe manner in the PLC and can be entered both when the program is running and also in any other program state.

Proceed as follows when forcing:

- Enter the inputs or outputs to be forced and the required values in the online list, marking them in the column F by pressing <F5>.
- You can now force the inputs or outputs in the PLC by selecting the *Force all* option or by pressing the hot key <E> for all variables marked accordingly in the online list.
- You can force individual inputs or outputs in the PLC by selecting the *Force single* option or by pressing the hot key <F>.

When does this forcing takes place?

Program running:

- Inputs, outputs or flags are forced immediately after enabling, even within the program cycle.

Program stopped:

- e.g. at breakpoint, in single cycle; inputs, outputs or flags are forced immediately and forcing takes effect immediately.

FORCE menu (Menu 5)

FORCE
Force single
Force all
Disable forcing all
Edit force list
Display force values
Jog
Continue
Stat. sel. var. On/Off
Bit/word (only FBD/LD)
Abs./Sym. (only FBD/LD)
Level higher

Force single, <F>

You can force an input, output or a flag in the PLC by selecting the *Force single* option or by pressing the hot key <F>. Forcing means that you can assign preset values to the inputs and outputs. These values retain their validity until you alter them again or cancel forcing by pressing the hot key <Alt> –E.

Beforehand, in the extended IL or the FBD/LD, you must position the cursor on the variable you wish to force.

The following input window appears when you select the *Force single* option or when you press the hot key <F>:

D	F	O	M	Variable	Symbol	B	Value	Long
	*			A 0.00,00			B 0	

Press the <Enter key> to confirm the display, after which the force value takes effect immediately in the PLC.

You can press the <ESC key> to cancel. In this case, no force value becomes active.

Force all, <E>

By selecting the *Force all* option or by pressing the hot key <E>, it is possible to force inputs, outputs and flags in the PLC. Forcing means that you can assign preset values to the inputs/outputs and flags. These values retain their validity until you change them again or until you cancel forcing again by pressing the hot key <Alt> –E.

Before you call the *Force all* option or press the hot key <E>, you must enter the inputs or outputs you wish to force along with the affiliated force values in the online list and you must mark them in the column F by pressing <F5>.

Disable forcing all, <Alt>-E

You can cancel forcing for all forced inputs and outputs by selecting the *Disable forcing all* option or by pressing the hot key <Alt>-E.

The markings in the online list are cancelled.

Edit force list, <O> (Enter online list)

You can call the editor to edit the online list by selecting the *Enter force list* option or by pressing the hot key <O>.

The programming system shows the following display:

ABB 07 ZE 60				ONLINE editor				EXAMPLE	
Entries: 2				Line: 1				Marked:D:0 F:0 O:0	
D	F	O	M	Variable	Symbol	B	Value	Long text	
	*			A 0.00,00		B 0			
				A 0.00,01		B 0			

Here, the online list is used to force status values of inputs and outputs in the PLC (column F).

Method:

Move the cursor to the column F. Mark the required variable by pressing <F5>. If you select 'Force all', only the marked variables will be forced. You can clear the marking again by pressing <F6>.

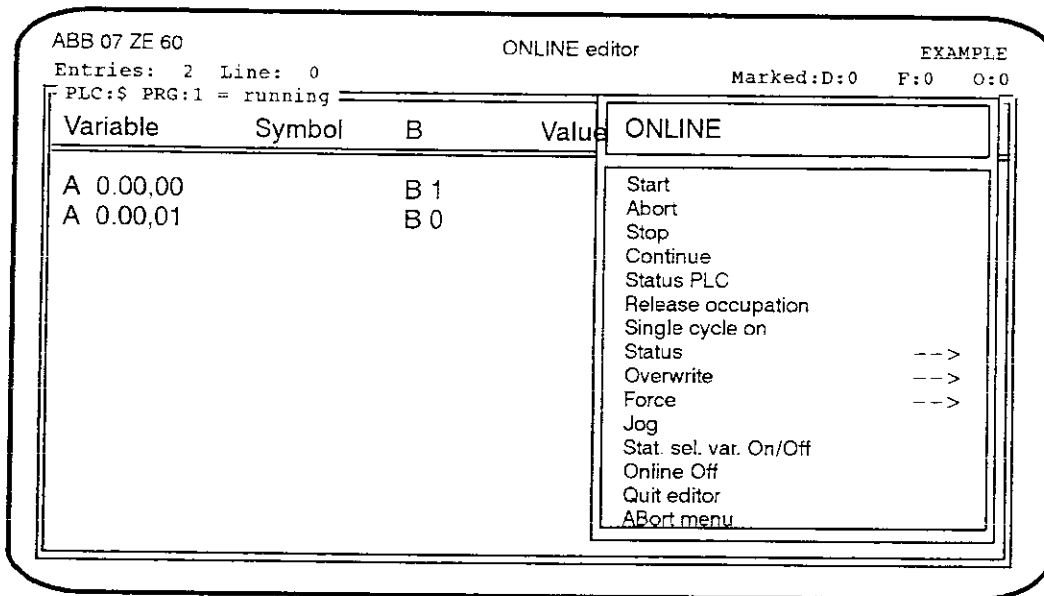
Within the editor for editing the online list, you can call the ONLINE EDITOR menu by pressing the <Space bar>.

ONLINE EDITOR menu (Menu 6)

ONLINE EDITOR
Edit Block commands Online on Change over layout Quit editor Abort menu

Online On

The programming system shows the following display when you select the *Online on* option:



The programming system now communicates with the PLC. The status values of the variables are displayed and the online functions are available.

FORCE menu continued (Menu 5)

Display force values, <Alt> -D

When you select the *Display force values* option, the inputs/outputs or flags forced in the PLC and the affiliated force values are read out of the PLC and are transferred to the Online list. You can select the *Enter force list* option or press the <O> hot key (in Online mode) to obtain information about the forced inputs/outputs or flags. The forced inputs/outputs or flags read in are marked as shown above.

Jog, <G>

This command is only effective in 'Single cycle' mode or when a breakpoint is set.

When you select the *Jog* option or press the hot key <G>

- in single cycle mode, the program is run through in the specified number of cycles
- when a breakpoint is set, the program is run once up to the breakpoint.

Continue program, <Alt> -C

The PLC program is continued when you select the *Continue* option or when you enter the command <Alt> -C. This function can only be activated from the 'Debug PLC stopped' state. Continue running the program from the 'Debug PLC stopped' state (-> 'Debug PLC running').

Status of selected variables On/Off, <A>

When you select the *Stat. sel. var. On/Off* option or when you press the hot key <A>, only the status values of the variables you have *selected* are updated on the screen. You select variables by entering them in the online list and by marking them in the column D. The statuses of all other variables are no longer updated. You can cancel this mode by once again selecting the *Stat. sel. var. On/Off* option or by pressing the hot key <A> and the statuses of all variables are updated on the screen.

Bit/word (only FBD/LD), <X>

When you select the *Bit/word (only FBD/LD)* option or when you press the hot key <X>, the status display for *Word variables* is switched over between the two forms of representation binary and word value.

Binary form of representation:

- in the FBD/LD, the variable name is highlighted visually if the value is unequal to zero.

Word value form of representation:

- in the FBD/LD, the value of the word variable is displayed instead of the variable name.

Absolute/Symbolic (only FBD/LD), <F9>

When you select the *Abs./Sym. (only FBD/LD)* option or when you press the <F9> key, the status display is toggled between the absolute and symbolic forms of representation, i.e. for the variables either the *absolute* or the *symbolic* designations are shown.

Level higher

You are returned to the ONLINE FUNCTIONS menu when you select the *Level higher* option.

ONLINE FUNCTIONS menu continued (Menu 1)

Jog, <G>

This command is only effective in 'Single cycle' mode or when a breakpoint is set.

When you select the *Jog* option or press the hot key <G>

- in single cycle mode, the program is run through in the specified number of cycles
- when a breakpoint is set, the program is run once up to the breakpoint.

Status of selected variables On/Off, <A>

When you select the *Stat. sel. var. On/Off* option or when you press the hot key <A>, the status values of the variables you have *selected* are updated on the screen. You select variables by entering them in the online list and by marking them in the column D. The statuses of all other variables are no longer updated.

You can cancel this mode by once again selecting the *Status of selected variables on/off* option or by pressing the hot key <A> and the statuses of *all* variables are updated on the screen.

Bit/word (only FBD/LD), <X>

When you select the *Bit/word (only FBD/LD)* option or when you press the hot key <X>, the status display for *Word variables* is switched over between the two forms of representation binary and word value.

Binary form of representation:

- in the FBD/LD, the variable name is highlighted visually if the value is unequal to zero.

Word value form of representation:

- in the FBD/LD, the value of the word variable is displayed instead of the variable name.

Absolute/Symbolic (only FBD/LD), <F9>

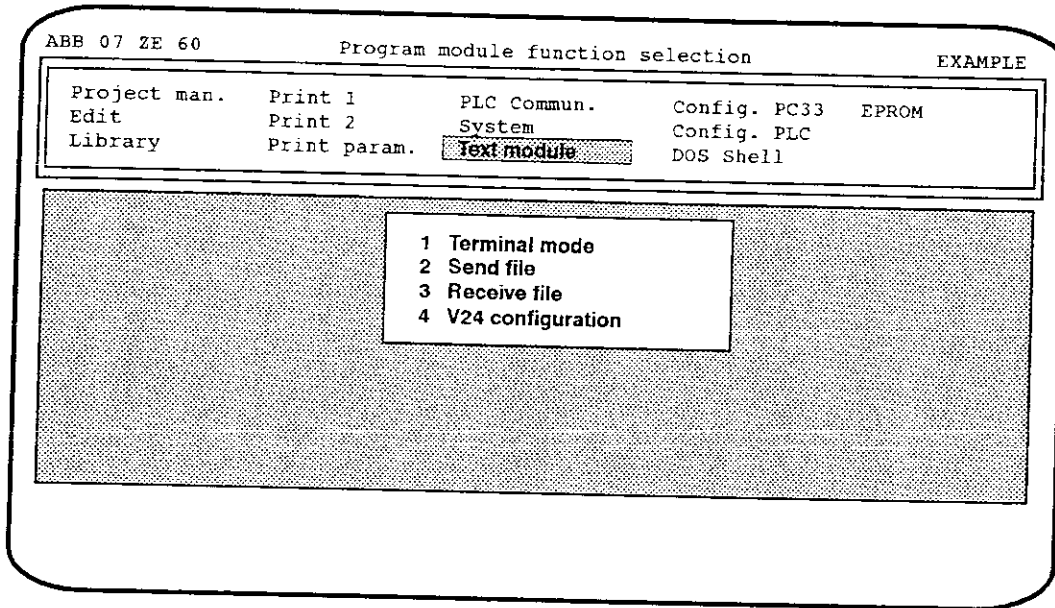
When you select the *Abs./Sym. (only FBD/LD)* option or when you press the <F9> key, the status display is toggled between the absolute and symbolic forms of representation, i.e. for the variables either the *absolute* or the *symbolic* designations are shown.

Level higher

When you select the *Level higher* option, you are returned to the function menu of the editor from where you called the ONLINE FUNCTIONS.

9 Communication with the text processor 07 KT 60

(Text module Main menu option)



This part of the program serves to communicate with the text processor 07 KT 60. For data backups and for archiving, the data of the 07 KT 60 can be saved onto the hard disk or on a floppy disk.

Refer to the relevant operating manual for a detailed description of how to handle the 07 KT 60.

Terminal mode

This function serves to access the editor integrated in the 07 KT 60 in order to enter and edit texts in the text memory of the 07 KT 60. Terminal mode is terminated by pressing the <F1> key.

907 PC 33 (PC) <--> 07 KT 60 transfer is realized with the system cable 07 SK 64 through the PC's serial interface COM 1 or COM 2.

Mode 1 must be set with the mode switch on the 07 KT 60 before transferring data or before working with the editor. When changing modes, the new mode does not become active until the "MODE CHG" pushbutton has been pressed. This pushbutton also activates the Edit mode of the 07 KT 60.

The interface parameter settings of the PC's serial interface and of the 07 KT 60 must agree.

After a change in the interface parameters on the 07 KT 60, these do not take effect until the "RES" key is actuated.

Send file

907 PC 33 (PC) --> 07 KT 60 transfer is realized with the system cable 07 SK 64 through the PC's serial interface COM 1.

Before transfer of the data, mode 2 must be set with the mode switch on the 07 KT 60. Display 20 then appears. When you change the mode, it will not take effect until you press the "MODE CHG" pushbutton.

There is no need to set the parameters of the PC's or the 07 KT 60's interface. Data transfers always take place with 4800 baud, 8 data bits, 1 stop bit, no parity.

After selection of the menu option, the contents of the file "project name.TMC" are transferred to the text memory of the 07 KT 60.

Receive file

907 PC 33 (PC) <-- 07 KT 60 transfer is realized with the system cable 07 SK 64 through the PC's serial interface COM 1.

Before the data transfer, mode 2 must be set with the mode switch on the 07 KT 60. Display 20 then appears.

There is no need to set the parameters of the PC's or the 07 KT 60's serial interface. Transfers are always realized with 4800 baud, 8 data bits, 1 stop bit, no parity.

After you select this option, the complete contents of the 07 KT 60 text memory are read out and stored in the file "project name.TMC".

V24 configuration

Set the PC's interface parameters to match the connected 07 KT 60 and select the serial interface COM 1 or COM 2.

10 EPROM PROGRAMMING

(EPROM main menu option)

This part of the program allows communication with the EPROM programmers 07 PP 31/32/33 through an RS232 interface (COM1). The EPROM programmer 07 PP 31/32/33 is controlled remotely from the programming and test system 907 PC 33.

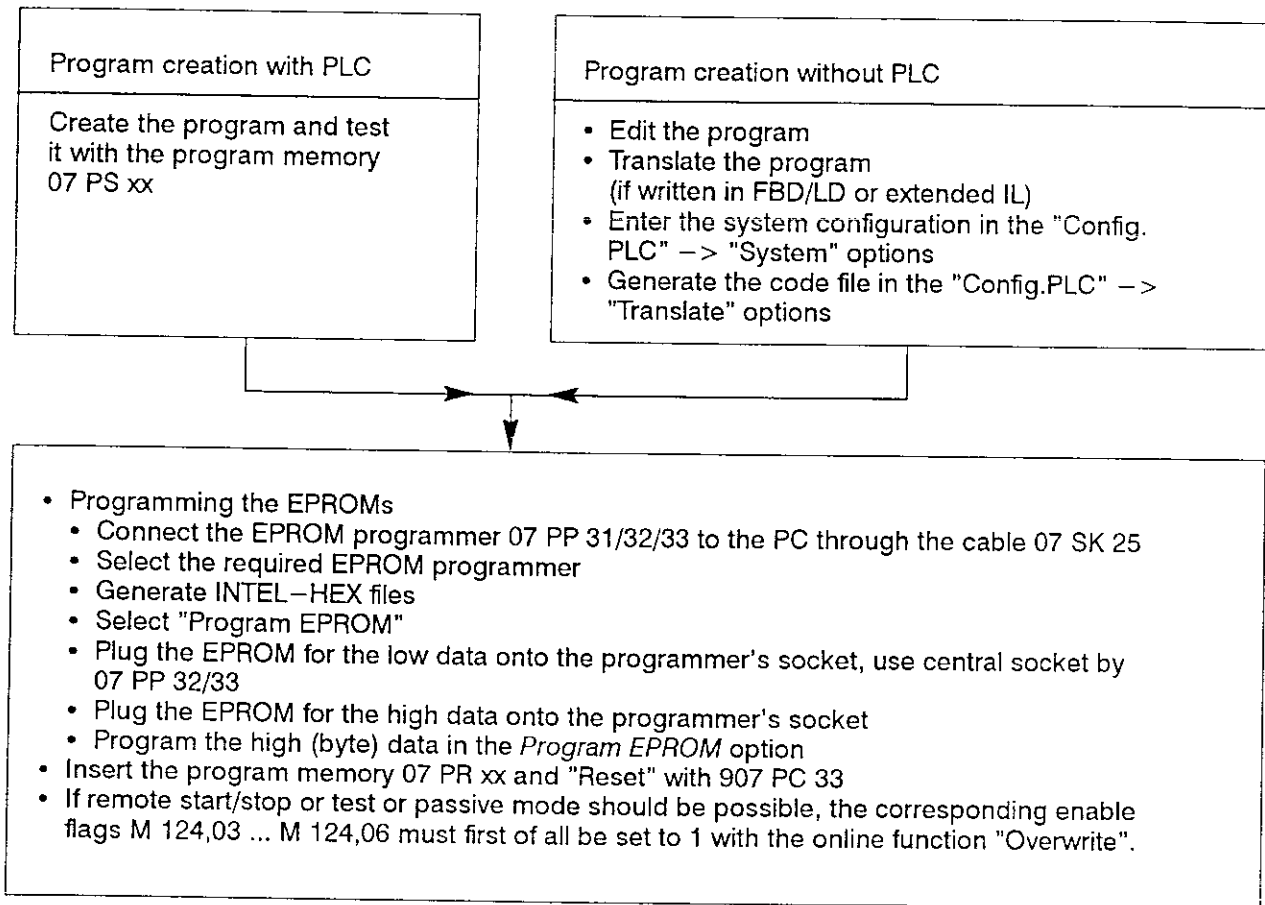
Note:

07 PP 31 corresponds to SE 4943

07 PP 32 corresponds to SE 4944

07 PP 33 corresponds to SE 4945

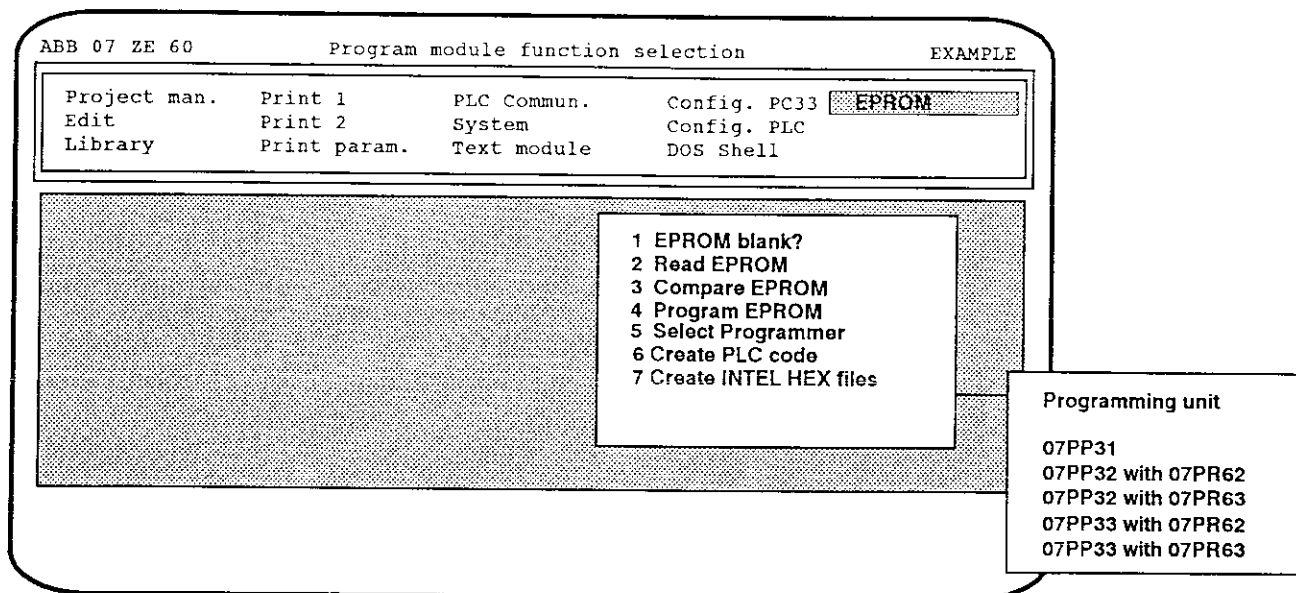
Carry out the following steps to program an EPROM pair:



Note:

It may be necessary to set a higher timeout value for the communication with the EPROM programmer than for the communication with the PLC.

The following functions are selected in the "EPROM" menu:



EPROM blank?

Check whether or not the EPROM in the socket of the 07 PP 31/32/33 contains data. If the EPROM is not blank, the programmer beeps and displays the first memory address that is not empty. For example, the message "***13; Verify error, key" is displayed. You must then press the "RESET" key on the EPROM programmer 07 PP 31/32/33, and the space bar on the 907 PC 33.

Read EPROM

The data from the low/high byte EPROM is first of all read into the 07 PP 31/32/33 RAM and then received by the PC. An Intel-HEX to HEX conversion then takes place and the IL and the parameter file (project name.SKF) are generated.

Compare EPROM

The data is read out of the low or high EPROM, sent to the PC and compared to the data already existing in the PC (INTELHEX files)

Method:

- Call "Compare EPROM"
- Plug the low byte EPROM onto the corresponding socket of the EPROM programmer. Press a key
- The contents of the EPROM are written into the EPROM programmer's RAM and the contents of the RAM are then transferred to the PC
- Plug the high byte EPROM onto the appropriate socket on the EPROM programmer and press a key

- The contents of the EPROM are transferred to the EPROM programmer's RAM and the contents of the RAM are then transferred to the PC.
- The low/high (byte) data from the EPROMS is compared to the data in the INTELHEX file. The result of the comparison is displayed.

The message "Differences: n in the code, m in the parameter area" (n and m stand for the number of differences) is displayed if there are differences in the program or in the parameters. Differences in the code means that the IL stored in the EPROM differs from the one in the PC. Differences in the parameter area mean different SKF files (containing, among other things, the system configuration) in the EPROM and PC.

Note:

This function is only supported in the 07 PP 31/32/33 programmers.

Program EPROM

First you have to generate the Intel-Hex-file

By using "Program EPROM" the EPROMs are programmed with the EPROM programmer 07 PP 31/32/32. The procedure is executed automatically and consists in several steps:

Step 1: Send Low (Byte) data

The data for the low byte EPROM are sent by the PC to the 07 PP 31/32/33 and read there in the RAM.

Step 2: Program Low EPROM

The data are written from the 07 PP 31/32/32 RAM into the low byte EPROM.

Step 3: Send High (Byte) Data

The data for the high byte EPROM are sent from the PC to the 07 PP 31/32/33 and written there in the RAM.

Step 4: Program High EPROM

The data are written from the 07 PP 31/32/33 RAM into the high byte EPROM.

907 PC 332 prompts you to insert the EPROMs in the socket of the programmer (for 07 PP 32/33: the central socket).

You will find a guide for installation of the EPROMs in the EPROM program memories 07 PR 62 and 07 PR 63 on the housing of the resp. module.

Select programmer

This option allows you to select the current programmer 07 PP 31/32/33.

- 07 PP 31 for EPROM program memory 07 PR 62
- 07 PP 32 for EPROM program memory 07 PR 62
- 07 PP 32 for EPROM program memory 07 PR 63
- 07 PP 33 for EPROM program memory 07 PR 62
- 07 PP 33 for EPROM program memory 07 PR 63

Create PLC code

see chapter 3.2.8

Generate INTEL–HEX files

Before programming EPROMs, the INTEL–HEX file must be generated. To do this, however, you must select the EPROM programmer and the EPROM program memory you wish to use (see above 'Select programmer').

Two files are created with the name project name.IHx (x = 1 for low byte, x = 2 for high byte) in which the contents of the affiliated EPROMs are saved in INTEL–HEX format.

Therefore, using the DOS "COPY" function, it is possible to transfer these files in INTEL–HEX format to any chosen EPROM programmer. In this case, you must make all settings relating to the PC and EPROM programmer yourself.

When using none of the EPROM programmers specified here, the 'Select programmer' function must nevertheless be run. When selecting a programmer, orient yourself to the program memory used. When using the EPROM program memory 07 PR 63, for example, you can select '07 PP 32 with 07 PR 63' or '07 PP 33 with 07 PR 63'.

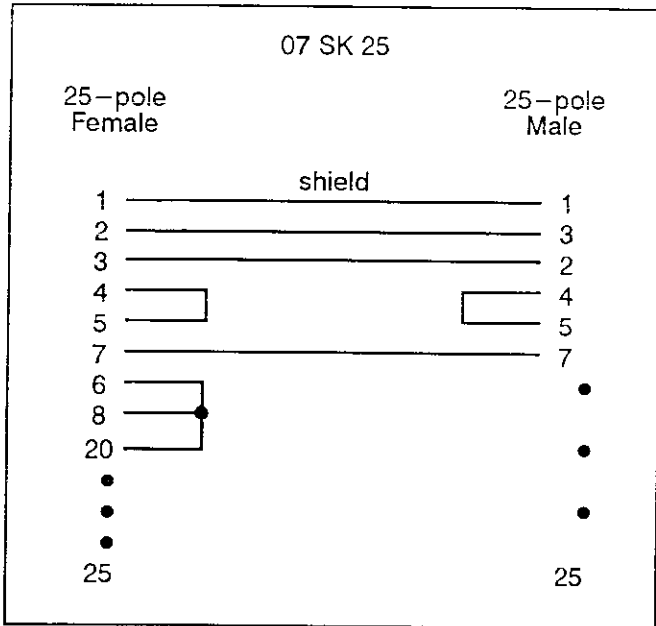
Example:

- Set the PC's interface with the MS DOS "MODE" command
- Establish the same interface setting on the EPROM programmer by means of the unit's keyboard
- Set INTEL–HEX format on the EPROM programmer with the unit's keyboard
- Set "Receive data through serial interface" on the EPROM programmer by means of the unit's keyboard
- Enter on the PC: COPY project name.IH1 COM1;
- Transfer the data from the RAM to the plugged–on EPROM (low bytes)
- Enter on the PC: COPY project name.IH2 COM1;
- Transfer the data from the RAM to the plugged–on EPROM (high byte).

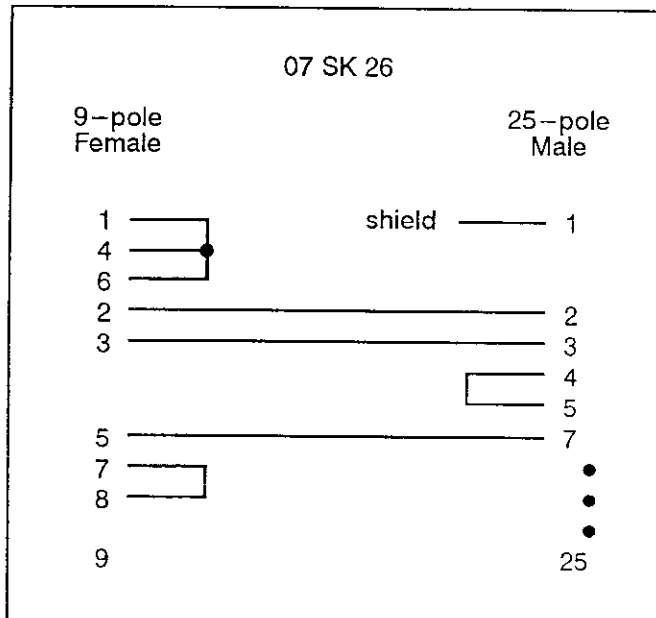
EPROM programmer connection

The EPROM programmer 07 PP 31/32/33 is connected to the PC's serial interface COM1 by means of the cable 07 SK 25 or 07 SK 26:

- a) The serial interface COM1 of the PC used is a 25-pole connection:



- b) The serial interface COM1 of the PC used is a 9-pole connection:



The data transfer format for EPROM programming is predefined and is set automatically by 907 PC 33 in the PC.

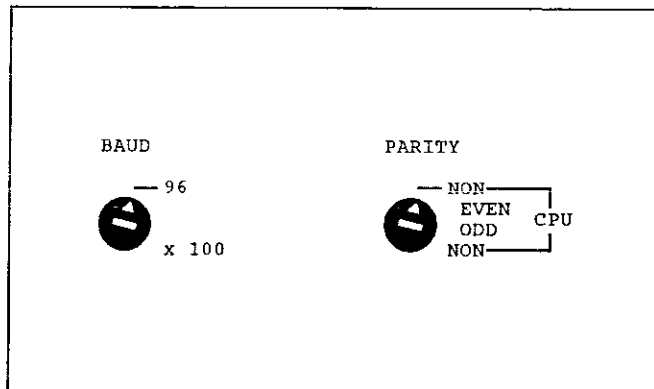
Using a small screwdriver, appropriately set the data transfer rate and parity on the left of the 07 PP 31/32: 9600 baud, NO PARITY (CPU).

On the 07 PP 33, this setting is established exclusively by the software.

Interface parameters for EPROM programming:

9600 Baud
8 Data bits
1 Stop bit
No parity

Hardware switches on 07 PP 31/32:



In the case of the 07 PP 31/32, check with the aid of the EPROM programmer's keyboard whether the unit's interface is set to software handshake (XON). If necessary, correct the setting (see EPROM programmer's manual or see below). All other settings such as the EPROM type are made automatically.

07 PP 31/32 settings

Selection	Display	Change	Save
SELECT A	BAUD		
▶	PARITY		
▶	XON	[▼] [▲]	
			SET

11 Program "Compare"

COMPARE Procedure

COMPARE is a utility program for comparing two IL files. It compares two print files sentence for sentence from a certain address till the end of the shorter file. It only reads the instructions of the instruction list printed in the files. Head, foot lines, commentaries and symbols are ignored. As a result, all sentences will be displayed, which not agree. If the sentences compared are of different length, both will be displayed. The comparison will be continued in the next sentence. If the only difference is the fact, that sentences have been deleted or added, COMPARE will display the rest of the sentences as different from the position on, where the sentences differ. In this case, COMPARE offers the possibility to start the comparison of the files from certain sentence numbers on, and with different numbers in different files. You can obtain different comparison methods by choosing parameters.

Before you use COMPARE

If you want to compare two PLC programs, you have to print the IL of each program first. You can print by choosing the main menu option *Print 1* -> submenu *IL*. For *print destination* enter a file name instead of the default *PRN*.

Note:

Commentaries are not allowed in the sentences of the IL to print.

Set left margin of the print file to 10 (main menu option *Print parameters* -> submenu *Print parameters* -> *Left margin: 10*)!

Using COMPARE

For using COMPARE, you must use the following syntax:

```
COMPARE file1 file2 output /parameter
```

file1 and *file2* are the names of the two files to be compared.

You can modify the display or saving of the result of the comparison by using *output*:

- If you omit *output*, the result will be displayed on the screen.
- If you enter *PRN*, the result will be printed on a printer.

- If you enter a *file name*, the result will be stored in this file.

You can modify the comparison and the output by entering different parameters, e.g. *'/DN'*.

You can use the following parameters:

- /L* Ignore sentence length
This parameter allows the comparison of sentences with different length from the start of the sentence till the end of the shorter sentence or till the first difference.
- /S* ignore sentence number
This parameter allows the comparison of sentences with different sentence numbers.
- /W* Ignore word number
This parameter allows to ignore the word numbers during the comparison.
- /C* Ignore commands
This parameter allows to ignore the commands in the words during the comparison. E.g. the difference between '&' and '&N' is ignored.
- /T* Ignore operand type
This parameter allows to ignore the operand types during the comparison.
- /A* Ignore operand address
This parameter allows to ignore the operand addresses during the comparison.
- /D* Display only quantity of different sentences
This parameter allows to display only the quantity of the different sentences.
- /N* Screen display not interrupted
Generally the display of the result of the comparison is stopped after each full screen page and is continued only after a key has been pressed. This parameter switches this interruption off.
- /Qn* Interrupt after n differences
This parameter allows to interrupt the display after n differences.

/1#xxxxx Begin comparison in file 1 with sentence number *xxxxxx*. This parameter allows to start the comparison in file 1 with sentence number *xxxxxx*. You have to enter a sentence number with 5 digits (e.g. */1#01013*). If this sentence number doesn't exist, an error message will be prompted. If you enter different start addresses for both files, the parameters */s* (Ignore sentence length) and */w* (Ignore word number) are switched on automatically.

/2#xxxxx Begin comparison in file 1 with sentence number *xxxxxx*. This parameter allows to start the comparison in file 2 with sentence number *xxxxxx*. You have to enter a sentence number with 5 digits (e.g. */2#01013*). If this sentence number doesn't exist, an error message will be prompted. If you enter different start ad-

resses for both files, the parameters */s* (Ignore sentence length) and */w* (Ignore word number) are switched on automatically.

After the comparison the quantity of differences found will be displayed. If no differences were found, the files are the same (except differences in ignored elements). You can also abort the comparison by pressing *<Esc>*.

Examples

COMPARE IL1.PRT IL2.PRT

Both files are compared and the result is displayed on the screen.

COMPARE IL1.PRT IL2.PRT COMPARE.DAT

Both files are compared and the result is stored in the file *COMPARE.DAT*.

COMPARE IL1.PRT IL2.PRT PRN /1#00002T

Both files are compared. In *IL1.PRT*, the comparison starts with sentence number 2. Operand types are ignored. The result is printed on a printer.



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