



# Programmable Safety Systems PSS-Range

Programming Device  
PSS SW PG, from Version 4.5  
Operating Manual  
Item No. 93 060



The spirit of safety.

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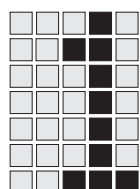
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We reserve the right to amend specifications without prior notice. We are grateful for any feedback on the contents of this manual.

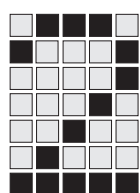
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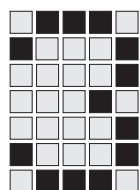
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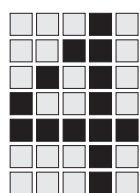
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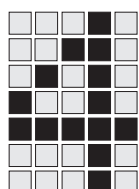
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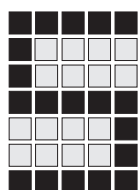
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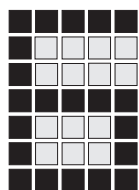
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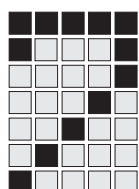
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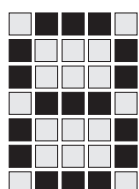
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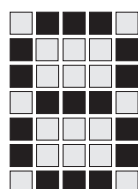
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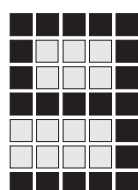
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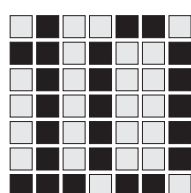
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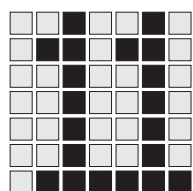
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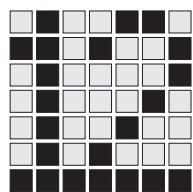
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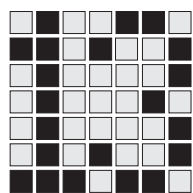
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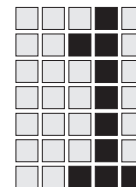
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# Introduction

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This manual forms part of the Programming Handbook for the PSS-Range. It explains how to use the PSS SW PG system software to create user programs. The operation of the system software for MS-DOS (also MS-DOS under Windows 3.1) and for Windows 95/98/ME/2000/NT 4.0 is identical, except for the installation.

The manual is divided into the following chapters:

- 1) Introduction
- 2) Installing the system software on a computer
- 3) Calling up the system software and how to use the menus
- 4) Using the editors to create blocks
- 5) A description of the functions used to edit blocks
- 6) An explanation of the commands used to edit an allocation table
- 7) A description of the program elements used when working on a project
- 8) A description of the configurator
- 9) Print and screen output
- 10) Online mode
- 11) Testing in online mode
- 12) Appendix
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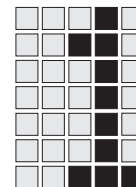
The system software must be installed on an IBM-compatible computer. Throughout the manual this computer will be referred to as the “programming device”.



## INFORMATION

This system software can be used to create user programs for all the systems in the PSS-range. For this reason the manual will simply refer generally to a “PSS”.

Descriptions are normally valid for the generation of both standard and failsafe programs. Exceptions will be marked. Descriptions which only refer to failsafe programming will be prefaced with “FS:”. Descriptions which only refer to standard programming will be prefaced with “ST:”.



# Introduction

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In most cases, screenshots will show the menus used during FS programming. Generally speaking, the menu for ST programming is very similar. If additional menu items are available for ST programming, these will be described in the text.

## Definition of symbols

Information in this manual that is of particular importance can be identified as follows:



### **DANGER!**

This warning must be heeded! It warns of a **hazardous situation that poses an immediate threat of serious injury and death**, and indicates preventive measures that can be taken.



### **WARNING!**

This warning must be heeded! It warns of a **hazardous situation that could lead to serious injury and death**, and indicates preventive measures that can be taken.



### **CAUTION!**

This refers to a hazard which can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



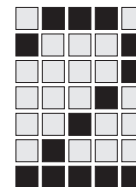
### **NOTICE**

This describes a situation in which the unit(s) could be damaged and also provides information on preventive measures that can be taken.



### **INFORMATION**

This gives advice on applications and provides information on special features, as well as highlighting areas within the text that are of particular importance.



# Installation

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## Hardware requirements

To install system software PSS SW PG for MS-DOS (also MS-DOS under Windows 3.1) and for Windows 95/98/ME/2000/NT 4.0 you will require the following hardware configuration:

- IBM-compatible computer
- Processor:  
80 486/100 MHz, Pentium or later
- RAM:  
PSS SW PG for MS-DOS: minimum of 550 kB available capacity  
PSS SW PG for Windows: minimum of 24 MB available capacity
- CD drive: alternatively, the files required for the installation can be copied from the installation CD on to 1.44 MB floppy disks (MS-DOS: x1, Windows: x2). The software can then be installed from floppy disk.
- Hard drive: Approximately 4 MB of available disk space
- Parallel interface for printer
- Serial port COM1 or COM2 for transferring data to the safety system
- Operating system:  
PSS SW PG for MS-DOS: MS-DOS from Version 5.0, also MS-DOS under Windows 3.1  
PSS SW PG for Windows: Windows 95, 98, ME, 2000 or NT 4.0

The computer on which the system software is installed is referred to throughout this manual as the “programming device”.

## Installing the program



### INFORMATION

There are two versions of the PSS SW PG system software:  
PSS SW PG for MS-DOS (also MS-DOS under Windows 3.1) and  
PSS SW PG for Windows 95/98/ME/2000/NT 4.0.  
Both versions are specifically designed for the stated operating system.  
You will experience problems if you install the system software for MS-DOS under Windows NT or vice-versa.

# Installation

## Installing PSS SW PG for MS-DOS

The program for both the failsafe and standard section will be installed when you install the PSS SW PG system software for MS-DOS (also MS-DOS under Windows 3.1).

The necessary files are stored in the "PG-DOS" directory on the installation CD. If a CD drive is not available when you are installing, copy the files from the "PG-DOS" directory on to a floppy disk and start the installation from the floppy.

**Requirement:** The "CONFIG.SYS" file must contain a value  $\geq 20$  for "files" and "buffers".

Insert the installation CD into the relevant drive and log on to this drive using MS-DOS commands. Switch to the "PG-DOS" directory and start the installation by entering:

INSTALL ↵

The installation program is loaded and a menu appears, enabling you to select a language. Use the arrow keys or the mouse to select the required language and press ↵. The installation menu will appear.

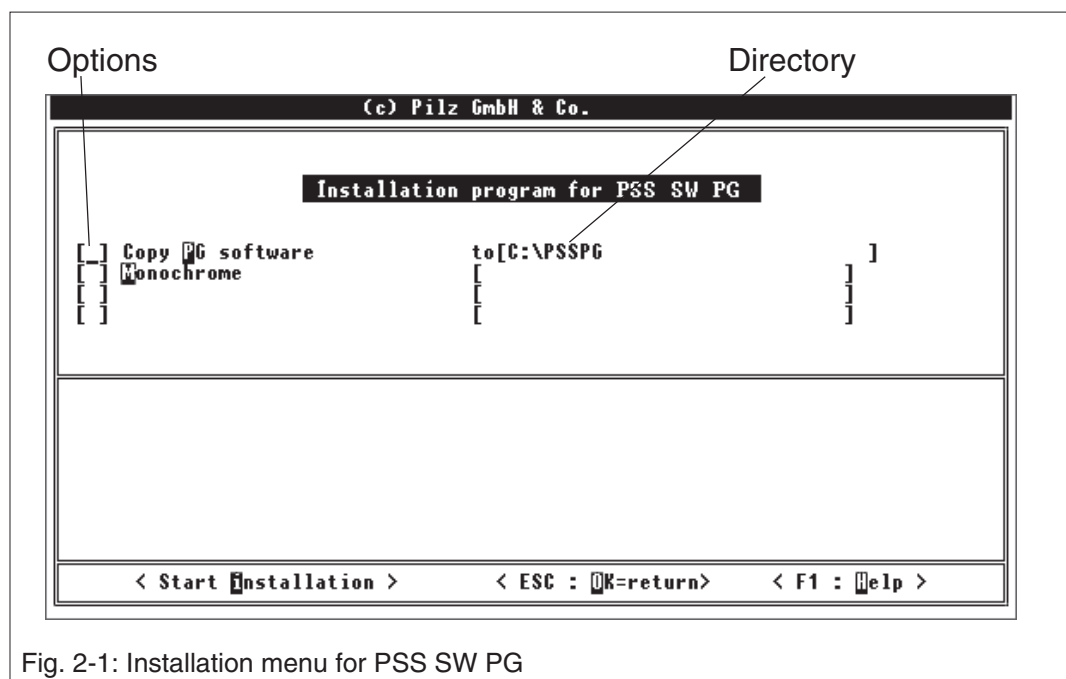
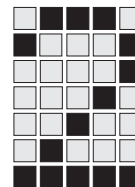


Fig. 2-1: Installation menu for PSS SW PG



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## Using the installation menu

- Selecting/de-selecting options
  - TAB: Moves from one option to the next without entering data.
  - ←↑: The option at the cursor position (flashing underline) is selected and an “X” is entered.
  - →↓: Selection is undone and the “X” is deleted.
  - Clicking on the option with the left mouse button: the option is selected and an “X” is entered. Clicking again will cancel the selection.
- Pressing the “ALT” key with the hotkey (highlighted letter) selects an option or command directly.
- Directory

The directory into which the system software will be installed is shown on the right-hand side of the screen. The default setting is: “C:\PSSPG”. You can change the default setting by pressing the “INS” or “DEL” keys. The directory path may be a maximum of 50 characters.

### Options:

- “Install PSS SW PG”
  - Always select this option on the first installation
  - The directory into which the software will be copied is shown to the right of this option. You can accept the default setting or enter a new directory (max. 50 characters). If no directory is shown, the information will be entered during installation.
- “Monochrome”

The software will be displayed in black and white.

When you have made all the relevant entries select the “Start Installation” command. If the installation has been successful a message will appear on screen. Confirm the message by pressing ↵. Some sample projects will also be created during installation. These will be stored in the folder called “exempl”.

## Making changes

To make changes to a previously installed system (e.g. to select “Monochrome”), you will need to call up the “INSTALL” program as for the first installation.

# Installation

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Only select options that were not installed during the first installation and are now to be installed as additional options. Use the arrow keys to delete the superfluous “X” symbols.

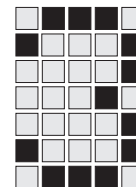
When you have entered all the changes, select “Start Installation”. The changes will now be implemented.

## Installing PSS SW PG for Windows

The program for both the failsafe and standard section will be installed when you install the PSS SW PG system software for Windows. The necessary files are stored in the “PG-WIN” directory on the installation CD. If a CD drive is not available when you are installing, copy the files from the directories “DISKS/DISK1” and “DISKS/DISK2” on to two floppy disks and start the installation from “DISK1”.

Sequence:

- Place the installation CD in the CD drive.
- If the CD does not start up automatically, switch to the “PG-WIN” directory and call up the file “setup.exe”.
- Follow the on-screen instructions.



# Start-up and System Management

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## Starting the system software

### Start-up

The system software has two operating modes:

- FS programming  
To create user programs for the safety-related (FS) section of the safety system.
- ST programming  
To create user programs for the non-safety-related (ST) section of the safety system.

### Starting the system software for MS-DOS:

One of two modes must be selected when the system software is started:

- Selection via parameters
  - FS programming: Under DOS, switch to the directory in which the system software is installed and start up the program by entering:

PSSPG FS ↵

- ST programming: Under DOS, switch to the directory in which the system software is installed and start up the program by entering:

PSSPG ST ↵

- Selection menu
  - Under DOS, switch to the directory in which the system software is installed and start up the program by entering:

PSSPG ↵

A selection window will appear.

- Enter “F” for failsafe programming, “S” for standard programming and “E” to exit the program  
or
- Select the required option using the arrow keys and confirm by pressing ↵.

# Start-up and System Management

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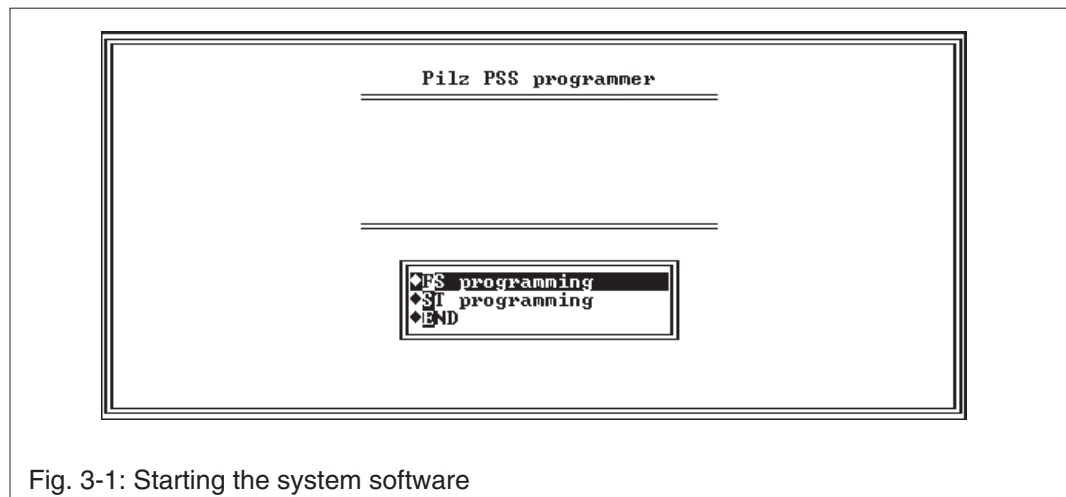


Fig. 3-1: Starting the system software


## Starting the system software for Windows:

Select “Start” > “Programs” > “PSS SW PG WIN” or click twice on the system software icon on the desktop.

A selection window will appear (Fig. 3-1).

- Enter “F” for failsafe programming, “S” for standard programming and “E” to exit the program  
or
- Use the arrow keys to select the required option and confirm by pressing ↵.

## Exiting the program

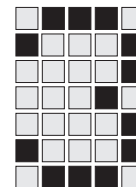
You can exit the system software by selecting “End”. The system software for Windows may **not** be closed via the  button in the window's top right-hand corner.



### INFORMATION

If cache memory is being used, all data must be written to the hard disk, or data could be lost.





## FS: Password

When you call up FS programming you will be asked to enter a password. The password is preset to "PSS3000". Enter the password and confirm by pressing ↵. The menu for the FS section of the system software will appear.

## FS: Changing the password

The password can only be changed in the FS section of the system software:

- Select "Default settings" from the "FS project" menu. A selection window will appear.
- Use the arrow keys to select "Change password" and confirm by pressing ↵.
- Enter the existing password and press ↵.
- Enter the new password, consisting of between 2 to 8 characters, and press ↵. As a final check you will be asked to enter the new password again and confirm.

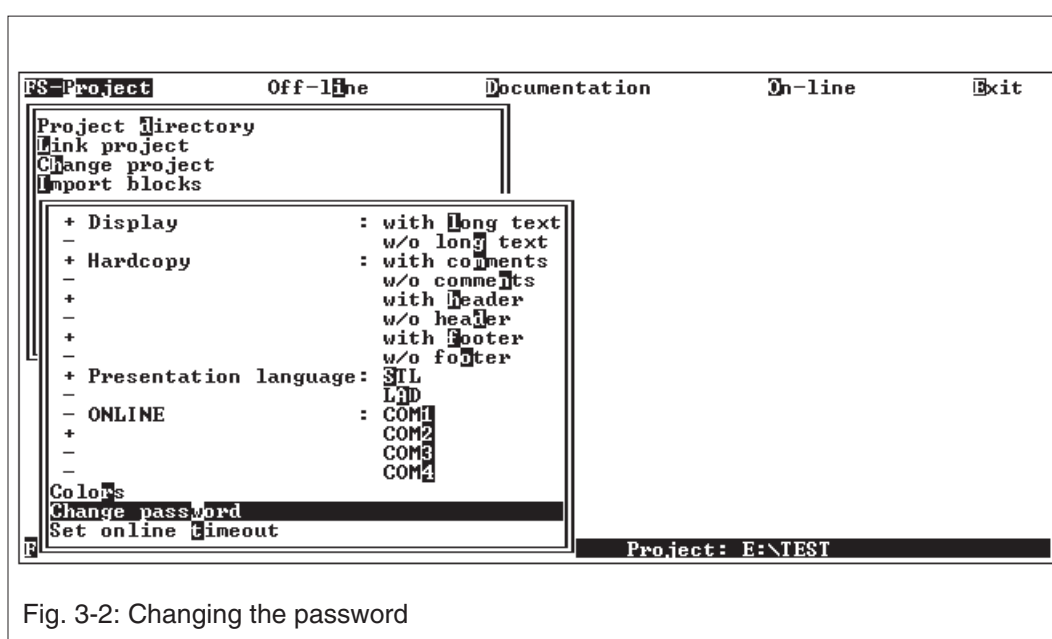


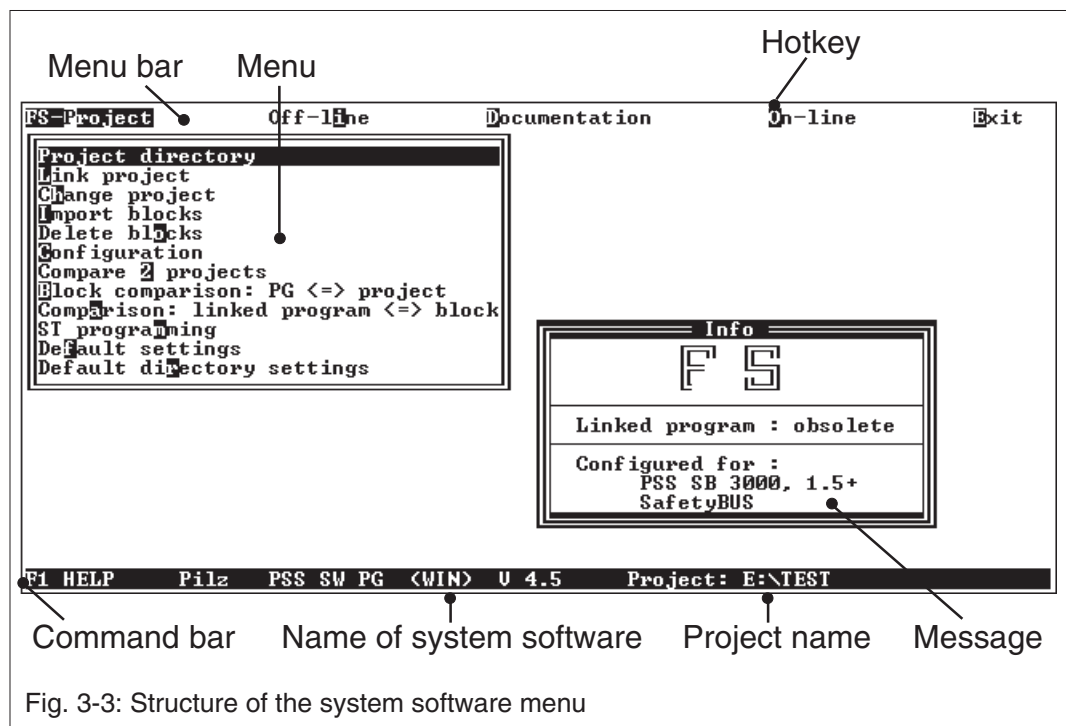
Fig. 3-2: Changing the password

# Start-up and System Management

## Managing the program interface

### Using the menus

The system software is menu-driven and therefore easy to use. A menu bar shows all the available menus. When a menu is selected, a window appears showing the menu items. These items are commands for certain operations or settings for particular functions.

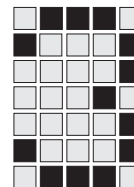


#### • Selecting a menu

- Hotkey: Enter the letter highlighted in the menu item name, e.g. "D" for "Documentation". The hotkeys in the menu bar can also be activated from the menus themselves. You can move from one menu to another by pressing "Alt" and the relevant hotkey.
- Arrow keys: Use the arrow keys ← and → to select an item on the menu bar. The menu will appear.

#### • Closing a menu

Press the ESCAPE key.



- **Selecting menu items**

Use the arrow keys ↑ and ↓ to select an item from the menu and confirm by pressing ↵.

- **Menu items with + and - characters**

These items are always in pairs and each switches the other off. Only one of the pair may be selected. The selected item is shown with a plus sign “+”; the non-selected item is shown with a minus sign “-”.

To select: Use the arrow keys to select the item you require and confirm your selection by pressing ↵.

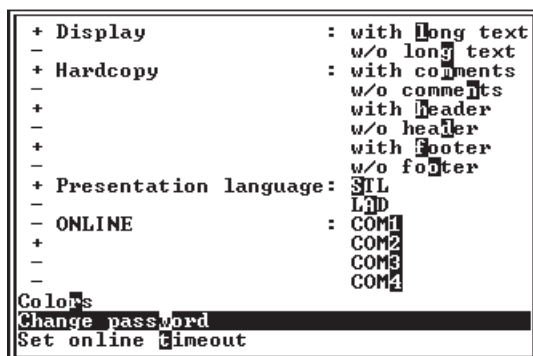


Fig. 3-4: Selecting menu items: “+” means selected, “-” means not selected.

- **Command bar**

The command bar will contain different items, depending on which menu is selected:

- Name of the system software and version number
- Function key assignment

The command bar shows how the function keys are assigned. The function keys are indicated by numbers. Number 1 corresponds to function key F1, number 2 to function key F2 etc. Pressing a function key will either execute the corresponding command or will bring up a further menu.

The operation of a function key may differ from menu to menu.

However, F1 always has the same function. From every menu and menu item, F1 can be used to call up a help text.

To close a help window press ESCAPE.

- Name of the project in the RAM.

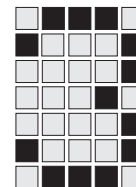
# Start-up and System Management

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## Entering data in the dialogue boxes

On some menu items (e.g. “Configurator”) a dialogue box will appear when a selection has been made. These allow you to make a number of entries.

- Selecting a given input option  
Highlight the option you want to select, i.e. by moving the cursor or the colour highlight to that option. Press ↵.
- Entering values  
Highlight the point at which the entry is to be made. Enter the value and press ↵.
- Deleting entries  
Highlight the entry to be deleted and press DELETE.
- Moving within the dialogue box  
Use the tabulator key to move between the different areas of the dialogue box.
- Exiting the dialogue box  
Press ESCAPE or “F10” (“F10” is only available under the configurator). The entries you have made will be saved. When you leave the dialogue box you will be asked to confirm that you wish to save the entries.



## Menu colours

The colours of the system software can be edited, provided you did not select “monochrome” when the software was installed. In the colour menu the options are divided into “active” and “passive”. “Passive” refers to the lettering and the background. “Active” refers to highlighted information such as the hotkeys on the menu bar.

### Edit colour

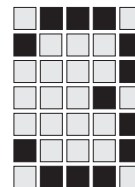
- Activate “Default settings” from the “FS project” or “ST project” menu. A pull-down menu will appear.
- Select “Colors”. Another menu will appear (Fig. 3-5). Colours can be edited for individual menu items such as the main menu, status line, footer, etc.

```

Main menu active
Main menu passive
Pull down menu active
Pull down menu passive
Editors active
Editors passive
Status lines active
Status lines passive
Foot lines active
Foot lines passive
Help messages
Error messages
Messages for operator guidance
On-line active
On-line passive
Dyn. program display, closed circuit
Dyn. program display, open circuit
Dyn. prog. displ. instruction exempt
Restore colors from delivery version
  
```

Fig. 3-5: Colour settings

- Activate a menu item  
A dialogue box with a colour palette appears on the right-hand side of the screen. Two arrows highlight the colour combination currently selected. The lines in the colour palette represent the foreground colour (lettering), the opaque areas show the background colour. In the bottom half of the window you can select a flashing foreground colour. The left hand side of the window shows the colours in normal mode, and the right hand side shows them as highlights.



# Start-up and System Management

---

- Use the arrow keys to move to the required colour field and press ↵. If you do not want to change the preset colour, exit the dialogue box by pressing ESCAPE.

All changes can be undone via the function "Restore colors from delivery version". This will restore the default colour setting.

## Window size

The window used for the system software can be displayed in three different sizes:

- 80 characters x 25 lines
- 80 characters x 43 lines
- 80 characters x 50 lines

It makes sense to set a large window, particularly when configuring SafetyBUS p.

### Setting the window size

- Right-click on the icon for the system software on the desktop and select "Properties".
- Call up the "Layout" tab and, under "Screen buffer size" and "Window size", enter 80 for "Width" and either 25, 43 or 50 for "Height".
- Click "OK".



# Editors

## Header editor

Each block has a block header. Each new block must have a block header created for it.

### Call-up:

Activate the “Header editor” from the “Off-line menu”. A window will appear, in which you can enter the block header.

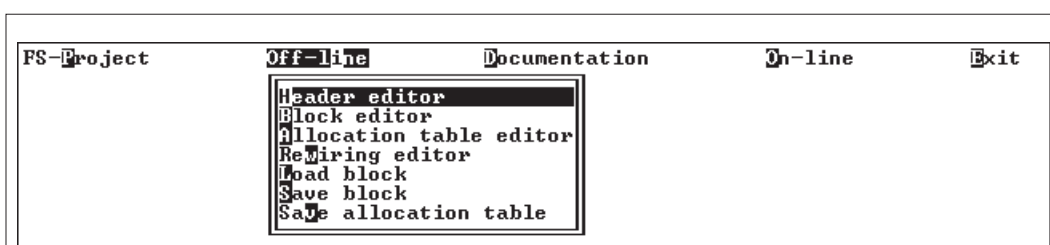


Fig. 4-1: Calling up the header editor

When you call up the editor, there may already be text entered in the window. This can be deleted before you enter the new text. Press F5 to clear the information.

There is no need to delete the text to copy an existing block; simply amend the type and/or number (see Chapter 5 “Copying a block”).



### INFORMATION

Only the block in the RAM is deleted, not the block saved on the hard drive.

### Operating mode

There are two editing modes: “MODIF.” and “INSERT”.

You can switch between these two modes by pressing “INS”. The current mode is shown in the upper right-hand corner of the screen.

- MODIF(Y): The character highlighted by the cursor is overwritten.
- INSERT: A character is inserted in front of the character highlighted by the cursor.

# Editors

## Editing a block header for OB and PB

- Enter the letter “O” for an organisation block or “P” for a program block, plus a three-figure number (the block number). Confirm by pressing ↵.
- Enter a name of your choice (e.g. MUL100 for a block that multiplies a value by 100) and confirm by pressing ↵.
- The block header is now ready. Leave the editor by pressing “ESC” and enter the commands in the block editor.

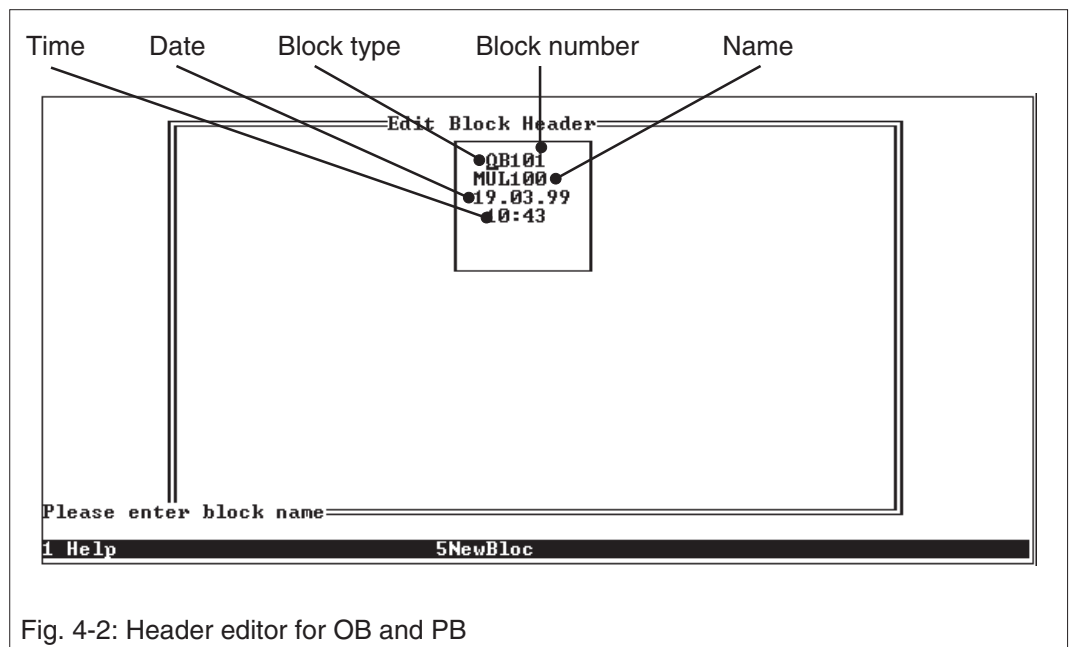


Fig. 4-2: Header editor for OB and PB

Block type: OB, PB  
Block number: 1 .... 255  
Name: Max. 8 characters  
Date and time are entered after the block has been saved.



### INFORMATION

The function of the individual organisation blocks is set by the operating system and is described in the Programming Manual. Details on which OBs are defined for your PSS can be found in your PSS System Description.





## Editing a block header for FB and SB

- Enter the letter “F” for function block or “S” for a standard function block, plus a three-figure number (the block number). Confirm by pressing ↵.  
Permitted range for standard function blocks: SB 001 ... SB 255  
Permitted range for function blocks: FB 001 ... FB 255



### INFORMATION

Pilz has a range of standard function blocks available. If you use the Pilz SBs and also edit your own, make sure that the numbers used on the two types of block are different.

- Enter a name of your choice (e.g. MUL100 for a block that multiplies a value by 100) and confirm by pressing ↵.

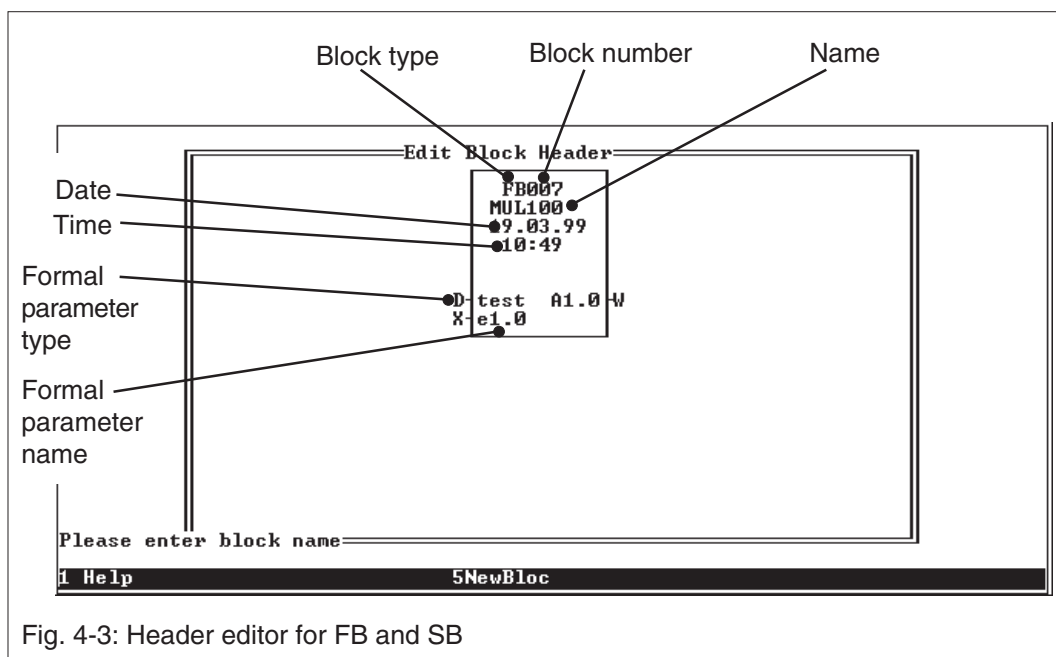


Fig. 4-3: Header editor for FB and SB

# Editors

---

Block type:	FB, SB
Block number:	1 .... 255
Name:	Max. 8 characters
Formal parameter name:	Max. 4 characters
Formal parameter type:	X (bit), B (byte), W (word), Z (timer/counter), D (data block)

Date and time will be entered after the block has been saved.

## Formal parameters

Function and standard function blocks can work with parameters. To do this, all formal parameters used in the program must be defined in the block header. A maximum of 64 parameters are permitted.

The formal parameters are replaced by actual parameters during the program cycle.



## NOTICE

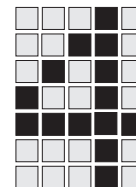
If a formal parameter is amended or extended in a block header, the actual parameter will need to be adapted to the new formal parameter for each block call.

## Entering formal input parameters:

- Press F2. Enter the parameter type and parameter name, e.g. x ein1. Confirm your entry by pressing ↵.
- Repeat the process if you wish to enter further input parameters.

## Entering formal output parameters:

- Press F3. Enter the parameter name and parameter type, e.g. aus1 x. Confirm your entry by pressing ↵.
- Repeat the process if you wish to enter further output parameters.



## Editing a block header for DB

- Enter the letter “D” for data block plus a three-figure number (the block number). Confirm by pressing ↵.  
Permitted range for data blocks: DB 000 ... DB 255.  
DB 000 ... DB 009 are reserved (see System Description).  
If you are using Pilz standard function blocks, DB 010 ... DB 019 will also be reserved. On a PSS with selective shutdown, one DB from the available range will be used as the configuration DB, so this will also be reserved.
- Enter a name of your choice and confirm by pressing ↵.
- Read/write status: the data block automatically receives read-only status (write-protection). Press F7 to cancel the write-protection and give the block read/write status. Press F6 key to reassign read-only status.

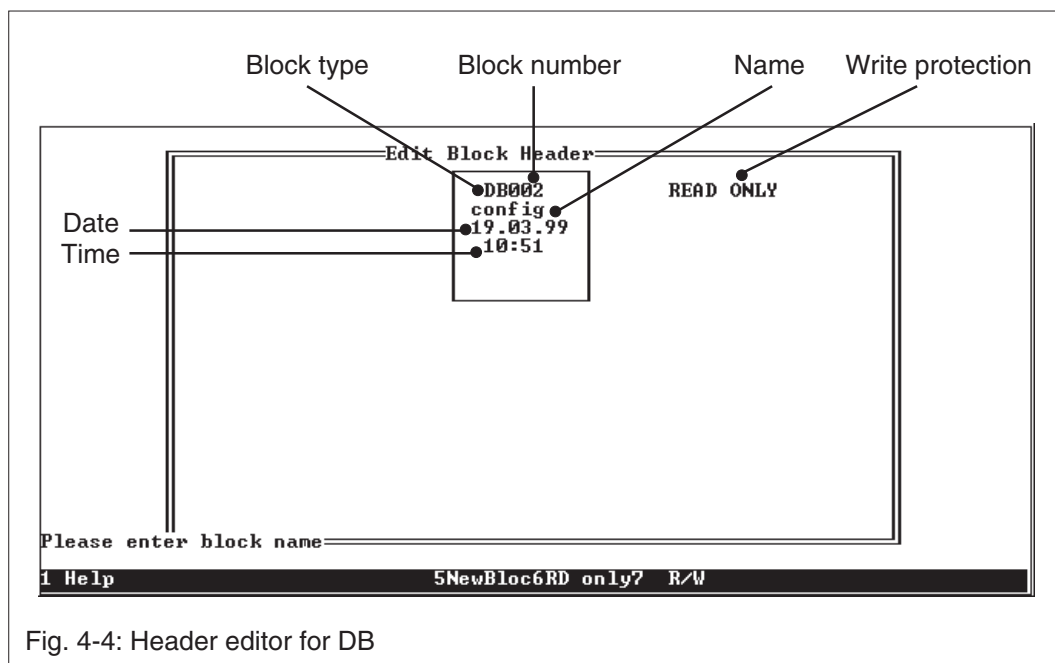


Fig. 4-4: Header editor for DB

Block type:	DB
Block number:	0 .... 255
Name:	Max. 8 characters
Write protection:	Read-only
	Read/write

Date and time will be entered after the block has been saved.

# Editors

## Block editor (for OB, PB, SB and FB)

### Selecting the entry format: STL or LAD

Using the block editor, the program can be entered in Statement List (STL) or Ladder Diagram (LAD). The entry format can be set through the “Default settings” menu or can be selected in the editor:

- Select “Default settings” from the “FS project” or “ST project” menu. A selection window will appear (Fig. 4-5).
- Select “Presentation language: STL” to show the program in Statement List or “Presentation language: LAD” to show the program as a Ladder Diagram.

**OR**

- Press F9 in the block editor. A selection window will appear. Select “Display instruct. in STL” or “Display instruct. as LAD”.

The presentation type set when the program is exited is always stored.

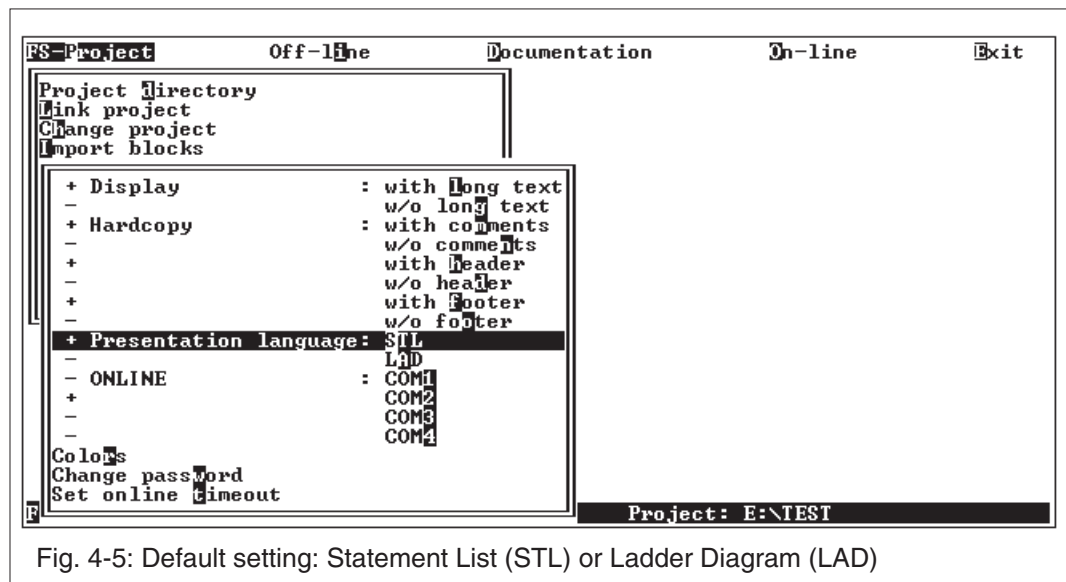
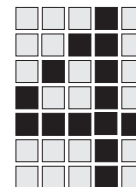


Fig. 4-5: Default setting: Statement List (STL) or Ladder Diagram (LAD)



## Calling up the block editor

Select “Block editor” from the “Off-line” menu.

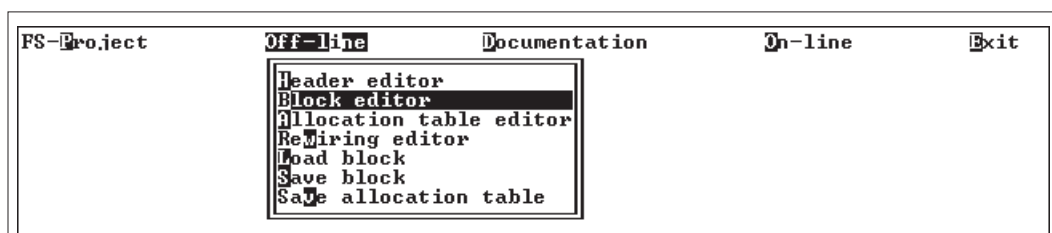


Fig. 4-6: Calling up the block editor



### INFORMATION

The editor can only be activated if a block has already been loaded or if a new block has been created using the header editor. The program checks which type of block it is and automatically calls up the correct editor. When the editor has been called up, the screen will look as shown in Fig. 4-7.

## Entering data in Statement List

There are two edit modes: “MODIF.” and “INSERT”.

You can switch between these two modes by pressing “INS”. The current mode is shown in the top right-hand corner of the screen.

- MODIF(Y): The character highlighted by the cursor (flashing underline) is overwritten.
- INSERT: A character is inserted in front of the character highlighted by the cursor (flashing underline).

### Entering/processing the instruction

An instruction is divided into four fields: the operator field, operand field, tag field and operand long text field.

When the editor is called up, the cursor will be highlighting the first line.

If you wish to edit an instruction you will need to highlight it first. Using the ↑ and ↓ keys, move the cursor to the line containing the instruction.

Press →. The fields belonging to the statement will be highlighted. Use the TAB key to move between the fields.

# Editors

To insert a new instruction, select “INSERT” mode and move the cursor to the line in front of which the new instruction is to be entered. Press ↵ and enter the instruction.



## INFORMATION

Instructions are entered in lower case and shown in upper case. With tags, you must differentiate between lower and upper case; with comments you may differentiate if you wish.

It is **not** necessary to enter spaces and leading zeros. Do not enter word commands in a block consisting of binary commands.

Example:

The entry:       le1.8

will be converted by the system software into:   L   E   1.08

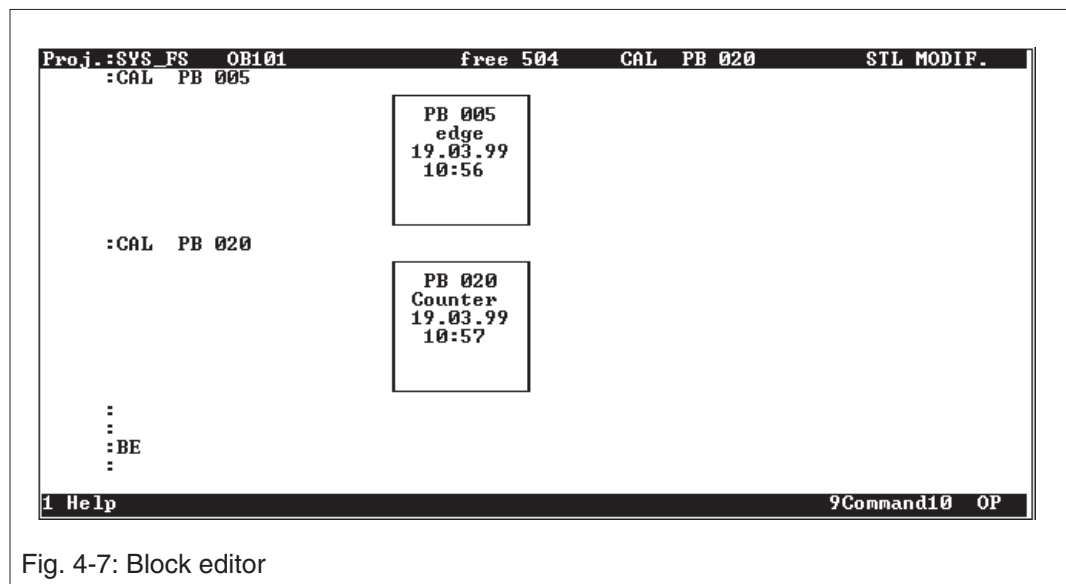


Fig. 4-7: Block editor

When a line is completed, the system software checks the allocation table to see if the operand and the tag already exist in another block. If they do not already exist, the new entry will automatically be entered into the allocation table. If the operand or tag has already been used, you will only need to enter one of the two values. The other value will automatically be read from the allocation table and entered into the instruction for the current block.



Example: the allocation table already contains the operand E 01.00, which is allocated the tag "INPUT1".

Enter in the block:

- Operator
- A full stop ".", to skip the operand field
- Tag "INPUT1"

When the line is completed, the operator E 01.00 will be entered automatically.

### Key functions

↵↓	Complete/scroll edited line
→	Select line containing the cursor
DEL	Delete line or character
HOME	Move cursor to first instruction
END	Move cursor to last instruction
PgUp	Scroll up one screen page
PgDn	Scroll down one screen page
i	Insert a blank line (cursor must be marked ":")
CTRL + Backspace	Retrieve last deleted block segment or deleted instruction (restore).
TAB	Move right to input fields
ESC	Undo previous entry/exit editor

### Editing commands

#### • Delete

- Delete instruction:  
Using the arrow keys, place the cursor on the colon in front of the instruction and press the "DEL" key. The instruction must not be highlighted.
- Delete part of an instruction  
Highlight the character you wish to delete and press the "DEL" key.

# Editors

- **Insert a blank line**

- Before a line:

Using the arrow keys, place the cursor on the colon at the beginning of the line in front of which the line is to be inserted and press the “i” key.

- After a line:

In INSERT mode, place the cursor on the second character of the line after which the line is to be inserted and press ↵.

- **Start block segment**

Enter “\*\*\*” and confirm by pressing ↵. The program will automatically add the designation “Segment xx”, in which xx is the segment number.

- **Segment label / name**

Position the cursor in front of the colon at the start of the block segment. A dialogue box will appear, in which you can enter the name. Enter a name and confirm by pressing ↵.

## Command overview

F10 calls up a list showing all the commands that are available. These commands are described in detail in the Programming Manual and Programming Shortform. Most of the commands have a help file in the editor: use the arrow keys to highlight the command and press F1.

FS:

Operation		
S	L	SPA
R	T	SPB
=	I	A
=N	D	CAL
SE	+	CALC
ZU	-	BE
ZR	*	AF
>	:	AS
!=	AND	
<	OR	BAS
KEW	XOR	STP
KZW	RL	SLU
TA	RR	SRU

ST:

Operation		
S	L	SPA
R	T	SPB
=	I	A
=N	D	CAL
SE	+	CALC
ZU	-	BE
ZR	*	DUF
>	:	DEF
!=	AND	
<	OR	BAS
KEW	XOR	STP
KZW	RL	SLU
TA	RR	SRU

Fig. 4-8: Command overview

Fig. 4-8: Command overview





## Editor control commands

Pressing F9 gives a list of control commands. These commands are explained below.

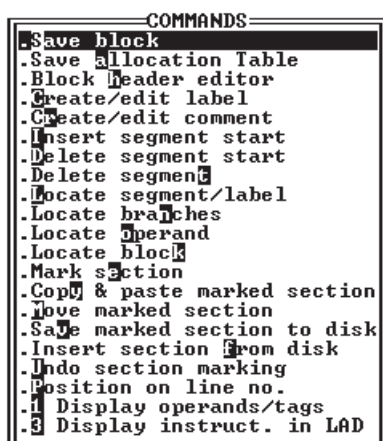


Fig. 4-9: Control commands

## Block commands

### • Insert segment start

- With the cursor at any point within the segment, highlight the segment to be copied and inserted.
- Press F9 and select "Mark section".
- Highlight the line after which the segment is to be inserted.
- Press F9 and select "Move marked section".
- The block segment will be inserted with no block start identifier ("Segment XX").

### • Delete block label

Press F9 and select "Undo section marking". The current block label will be removed.

### • Move without block start identifier

- With the cursor at any point within the segment, highlight the segment you wish to move.
- Press F9 and select "Mark section".

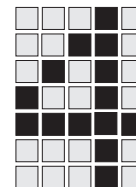
# Editors

---

- Highlight the line after which the segment is to be inserted.
- Press F9 and select "Copy and paste marked section".
- The segment is moved with no block start identifier ("Segment XX").
- **Save block segment**
  - With the cursor at any point within the segment, highlight the segment you wish to save.
  - Press F9 and select "Mark section".
  - Press F9 and select "Save marked section to disk".
  - A dialogue box will appear, in which you can enter a name. Enter a name and confirm by pressing ↵.
  - The segment will be saved under this name with a .BNW extension, in a file in the system directory.
- **Insert segment from disk**
  - Using the cursor, highlight the position at which the segment is to be inserted.
  - Press F9 and select "Insert section from disk"
  - A window appears, showing the names of all the segment files that have previously been saved. Use the arrow keys to select the required file and confirm by pressing ↵.
  - The file or block segment will be inserted at the position highlighted.

## Locate commands

- **Locate segment/label**
  - Press F9 and select "Locate segment/label".
  - A dialogue box will appear, in which you can enter the number of the segment to be located. Enter the number and confirm by pressing ↵. To locate a label (the name of the block segment), enter "=" in the first window position. Edit the text and confirm by pressing ↵.
  - Provided it exists, the segment/label will be displayed on screen, highlighted by the cursor.



---

- **Locate branches**

- Press F9 and select “Locate branches”.
- A dialogue box will appear, in which you can enter the number of the block segment. The system is looking for the segment number entered as the branch target when the branch command was entered. Enter the number you want to locate and confirm by pressing ↵. To locate a label (block segment name) enter “=” in the first window position. Edit the text and confirm by pressing ↵.
- Provided it exists, the branch command will be displayed on screen, highlighted by the cursor.

- **Locate block**

- Press F9 and select “Locate block”.
- A dialogue box will appear, in which you can enter the name of the block you wish to locate (e.g. PB 120) and confirm by pressing ↵. Another dialogue box appears, in which you can enter the search direction:
  - U = Up from the current cursor position
  - D = Down from the current cursor position
  - A = All the document
- Provided the block exists it will be displayed on screen, highlighted by the cursor.

- **Locate operand**

- Press F9 and select “Locate operand”.
- A dialogue box appears, in which you can enter the name of the operand you want to locate (e.g. A 1.0). Confirm by pressing ↵. To search for a tag, enter a full stop in the first window position of the input window. Edit the text and confirm by pressing ↵. Another dialogue box appears, in which you can enter the search direction:
  - U = Up from the current cursor position
  - D = Down from the current cursor position
  - A = All the document
- Provided the operand (or tag) exists, it will be displayed on screen, highlighted by the cursor.

# Editors

---

## Block segment commands

- **Delete segment**

- Using the cursor, highlight the segment at any point.
- Press F9 and select "Delete segment".
- A prompt appears on the screen: "Delete whole segment Y/N?". Enter "Y" and confirm by pressing ↵. The highlighted segment will be deleted.

- **Delete segment start**

- Using the cursor, highlight the start of the segment ("Segment XX" line).
- Press F9 and select "Delete segment start". The start of the segment will be deleted.

OR

- Highlight the colon in the line containing the start of the segment.
- Press "DEL".

- **Insert segment start**

- Using the cursor, highlight the line in front of which the segment start is to be inserted.
- Press F9 and select "Insert segment start".

OR

- Enter "\*\*\*" in the relevant line.
- The segment start will be inserted and the numbers of all subsequent segments will be increased by one.

- **Create/edit label**

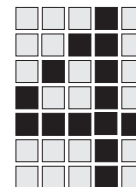
- Highlight the segment at any point.
- Press F9 and select "Create/edit label".
- A dialogue box will appear, in which you can enter the name of the new label.

OR

Using the cursor, highlight the segment start and press the ← key to open the dialogue box that enables you to enter the name.

- **Create/edit comment**

- Highlight the segment at any point.
- Press F9 and select "Create/edit comment".



- Enter a comment using a maximum of 64,000 characters (approx. 64 KByte) per block. Exit by pressing “ESC”. The comment will automatically be assigned to the highlighted segment.

- **Block header editor**

See section entitled “Header editor”.

- **Save allocation table**

- Press F9 and select “Save allocation table”.
- All new operands and tags entered in the current block will be saved in the allocation table.

The allocation table can also be saved when you exit the system software. In this case, all allocation changes within the project will be saved, not just the changes in the current block, as described here.

- **Save block**

- Press F9 and select “Save block”.
- If the block has been saved previously, a prompt will appear: “Overwrite block on disk Y/N?”. Enter “Y” if you wish to overwrite the old version of the block. If not enter “N”, type in a name for the block in the header editor and then save again.

## Entering data as a Ladder Diagram

The ladder diagram format is particularly good for showing logic connections.

In a ladder diagram, a maximum of 7 symbols and one output symbol can be placed alongside each other. Multiple outputs are drawn one beneath the other.

There are various types of symbols:

- **Ladder diagram symbols**

These are displayed in the footer. A specific symbol can be placed at the cursor position by pressing the relevant function key.

- **Word symbols**

Press F10. A window appears, showing all the commands that are available (see also Fig. 4-8). Using the cursor, highlight the command you require and confirm by pressing ↵. The command will be shown enclosed within a box.

# Editors

---

- Unconditional jump commands, block calls and block ends  
See under “Word symbols”.

Only ladder diagram symbols can be displayed in a continuous ladder diagram. Word commands are always entered separately within a frame. Unconditional jump commands, plus block call and block end commands must always be entered separately. Commands available at the current cursor position are highlighted (marked by a diamond) in the command window. Commands that are not highlighted cannot be inserted at that cursor position.

## Editor commands

### In the command line:

- F2: Branch downwards  
The path branches downwards from the cursor position (binary OR).
- F3: Branch upwards  
Completes a downwards branch and branches upwards.
- F4: Horizontal connection  
A horizontal line is displayed. No program code is generated.
- F5: Insert line  
A line is inserted at the cursor position.
- F6: Shift right  
The contacts to the right of the cursor are shifted right.
- F7: N/O contact  
Corresponds to a binary LOAD, AND or OR function.
- F8: N/C contact  
Corresponds to a binary LOAD-NOT, AND-NOT or OR-NOT function.

### Keyboard commands:

- Delete symbol  
Place the cursor next to the symbol and press “DEL”.
- Change operand  
Place the cursor below the letters of the operand you wish to change and enter the letters of the new operand. A dialogue box will appear.



- Delete line  
Place the cursor on the line and press “DEL”.
- Undo delete  
Press “CTRL” + “Backspace”. Only use this command directly after deleting, otherwise you will lose all the commands entered between the delete and the undo command.
- Delete a path started within a Ladder Diagram.  
Press “ESC”.
- Delete individual contacts on a path started within a Ladder Diagram  
Press “Backspace”.
- Jump labels  
Always insert the character “=” before the jump label
- Labelling the symbols  
Ladder diagram symbols can either be labelled with the operand or with the symbolic name of the operand. Press F9 and change the label type by clicking on the line “Display operands/elements”.
- Insert word commands  
Place the cursor beneath the last word command and press “i”.  
Additional editor commands are available within a window. Press F9 and a window will appear which is identical to the one used to enter the Statement List (see Fig. 4-9).

#### Positioning commands

Cursor←	Move one symbol left
Cursor→	Move one symbol right
Cursor↑	Move up one line
Cursor↓	Move down one line
PgUp	Move up one screen page
PgDn	Move down one screen page
HOME	Move to start of block
END	Move to end of block
CTRL + PgUp	Move to previous block
CTRL + PgDn	Move to next block
TAB	Move to end of line

# Editors

## Block editor for DB

Data within a block can be read from and sent to the PSS via the programming device. A data block can also be used as a parameter when calling up a function block.

### Calling up the block editor for DB

- Load a data block or create a new one by entering a block header (see section entitled “Header editor”).
- Activate “Block editor” from the “Off-line” menu. The screen will look as shown in Fig. 4-10.

Proj.:SYS_FS DB032 DW 0 free 0				MODIF.
DW	Typ	Content	Comment	
0000	C	SP	Identification ... DB configuration	
0001	C	S		
0002	H	FFFE	Identification ... Module shutdown	
0003	H	0000	reserved	
0004	H	0020	Identification ... PG version listing	
0005	Y	255,000	Tolerance types	
0006	Y	255,255	002	
0007	Y	255,255	004	
0008	Y	255,255	006	
0009	Y	255,255	008	
0010	Y	255,255	010	
0011	Y	255,255	012	
0012	Y	255,255	014	
0013	Y	255,255	016	
0014	Y	255,255	018	
0015	Y	255,255	020	
0016	Y	255,255	022	
0017	Y	255,255	024	
0018	Y	255,255	026	

1 Help	9Command
--------	----------

Fig. 4-10: Block editor for data blocks

Coding:

Type	Character	Range
C	Two IBM ASCII characters	---
F	Fixed point number	-32768 ... +32767
H	Hexadecimal number	0000 ... FFFF
M	Bit state	16 bit
Y	Two byte constant	0 ... 255 per byte





## Entering data

A new data block is automatically assigned data word 0000, with the contents 0000.



### INFORMATION

“INSERT” mode should be selected (press “INS”).

#### • New line

- Press ↵. A new line will be inserted, with the entry:  
xxxx H 0000

If the cursor is located on the data word type, the line will be inserted in front of it, otherwise it will be inserted below.

OR

- Press F9 and select “Define data block length”.

A dialogue box will appear, enabling you to set the length of the data block. Enter the number of data words you wish to save in this data block (maximum 1024) and confirm your entry by pressing ↵. The number of data words required will be entered and assigned a value of 0000. Any data words edited previously will remain unchanged.

Example:

By pressing ↵, a new line is to be inserted in front of the line highlighted by the cursor. The contents of the highlighted data word (and all subsequent data words) will be written into the next data word(s). The highlighted data word will be assigned a contents of 0000 and may be rewritten.

DW	Type	Contents		DW	Type	Contents
99	H	2000	→	99	H	2000
100	<u>H</u>	3000		100	<u>H</u>	0000
101	H	4000		101	H	3000
				102	H	4000



### INFORMATION

As data words in the program are addressed by their numbers, you will need to take account of any changes caused by adding lines.

# Editors

---

- **Edit value**

Using the arrow keys, highlight the character to be edited and enter the value you require.

- **Delete line**

Highlight the line by placing the cursor anywhere along it and press "DEL".



## **INFORMATION**

When you delete a line, the contents of all the data words that follow will automatically be moved up one line or one data word number. As data words in the program are addressed by their numbers, you will need to take account of any such changes caused by deleting lines.

- **Data word comment**

Each data word can have a comment of a maximum of 45 characters. Simply move the cursor to the comment field and enter the text.

- **Copy block**

This command enables you to copy one or more comment lines.

- Using the cursor, highlight the first character of the block to be copied and press F2.
- Highlight the last character of the block to be copied and press F2.
- Move the cursor to the point at which you wish to insert the block.
- Press F3. The block will be inserted at the highlighted position.

- **Delete block**

- Highlight the block as described above under "Copy block".
- Press F5. The block will be deleted.

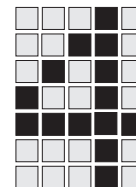
- **Delete block labels**

Press F4. The block labels will be deleted.

- **Scroll through data word list**

Press "PgDn" or "PgUp" to move up or down one screen page.

Press "Ctrl" + "PgDn" or "Ctrl" + "PgUp" to move to the end or start of the data block.



---

- **Locate data word**

Press F9 and select “Locate data word address”. Enter the number of the data word to be located and confirm by pressing ↵.

The data word you require will be displayed, highlighted by the cursor.

- **Data block comment**

Press F9 and select “Edit block comment”. Text assigned to the data block (but not the data word) can be edited.

- **Edit block header**

Press F9 and select “Block header editor”. The name, number and ID can be edited (see section entitled “Header editor”).

- **Save block**

Press F9 and select “Save block”. The block will be saved, or, if the data block has already been created and saved, a prompt will appear:

“Overwrite block on disk <Y/N>” Enter “Y” to overwrite the existing block on the hard drive. Enter “N” to save the block under a new name. You can change the data block number via the header editor and then save again.

# Editors

## Allocation table editor

An allocation table is generated automatically when a block is created. The allocation table editor enables you to edit this table or create new tables. If you want to amend allocations that have already been entered, follow the instructions in the chapter entitled “Processing the Allocation Table”.

## Calling up the allocation table editor

Select “Allocation table editor” from the “Off-line” menu. A table will appear, as shown in Fig. 4-11.

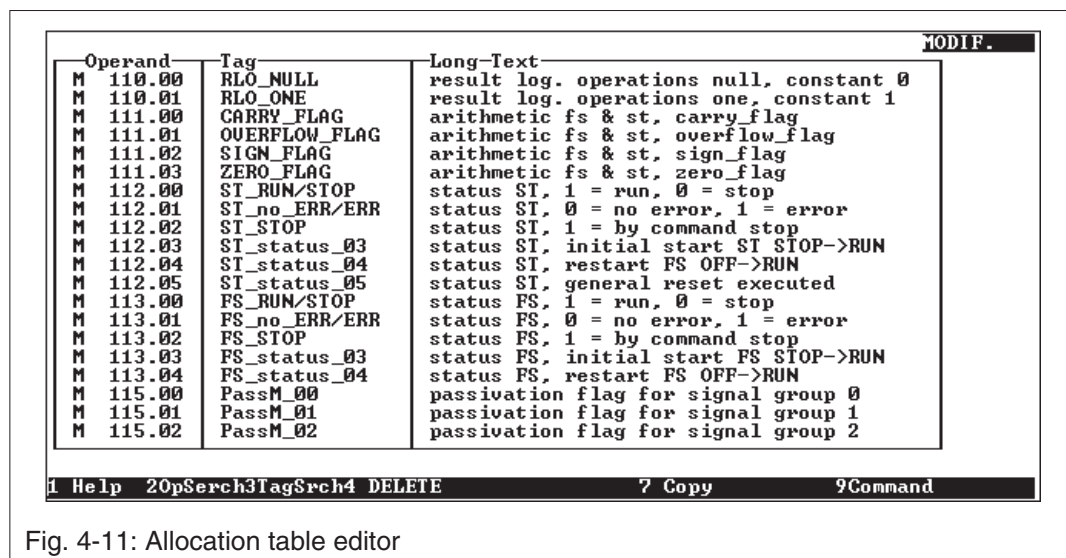
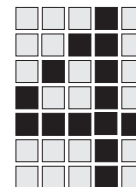


Fig. 4-11: Allocation table editor

### Key functions in the allocation table editor:

DEL	Delete line or character
HOME	Move cursor to first allocation
END	Move cursor to last allocation
PgUp	Scroll up one screen page
PgDn	Scroll down one screen page
↵↵	Complete / scroll edited line
TAB	Move to the next input field to the right
ESC	Delete last line not confirmed with ↵ / exit editor



---

## Entering data

- **Enter values**

- Enter the operand in the first column.
- Move the cursor to the “Tag” column using the arrow or “TAB” key.
- Enter a tag name with a maximum of 14 characters. Take care to differentiate between upper and lower case characters.
- Use the arrow or “TAB” key to access the long text column.
- Enter the required text, or accept the values already entered by pressing ↵ and then move to the next line.

- **Copy lines**

- Use the arrow keys ↑↓ to highlight the line to be copied.
- Press F7. The copied line will be inserted below the original line.
- Amend the operand on the line you have copied. If you do not do this you will receive an error message, as the program automatically recognises duplicate operands or tags (double allocation).
- Edit one or more characters

OR

- Use the cursor to highlight any allocation.
- Overwrite the operand with the required value.
- Press “TAB”. The allocation will be copied and displayed in the line below the original line. The cursor will be positioned in the tag field.
- Edit the tag and long text.
- Confirm by pressing ↵. The allocation will be filed in the table.

**Please note:** The allocations in the table are always arranged in a set order:

- Inputs
- Outputs
- Flags
- Periphery words/bytes
- Timers
- Counters

## Editors

---

An allocation that is copied or edited will automatically be entered in the table.

Example:

The line M100.00 Flag 100 is to be added to the following allocation table.

Allocation table:

Operand	Tag	Long text
E02.00	Input 2	
A02.00	Output 2	
<b>M102.00</b>	<b>Flag 102</b>	
M104.00	Flag 104	

Using the arrow keys, highlight the line M102.00 and press F7.

Operand	Tag	Long text
E02.00	Input 2	
A02.00	Output 2	
M102.00	Flag 102	
<b>M102.00</b>	<b>Flag 102</b>	
M104.00	Flag 104	

Amend the operand and tag in the copied line.

Operand	Tag	Long text
E 02.00	Input 2	
A02.00	Output 2	
M102.00	Flag 102	
<b>M100.00</b>	<b>Flag 100</b>	
M104.00	Flag 104	

Confirm by pressing ↵. The new line will be filed in the correct order.



---

Operand	Tag	Long text
E02.00	Input 2	
A02.00	Output 2	
<b>M100.00</b>	<b>Flag 100</b>	
M102.00	Flag 102	
M104.00	Flag 104	

- **Delete line**

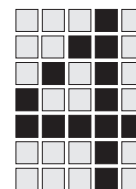
- Highlight the line using the arrow keys.
- Press F4.

- **Locate operand (tag)**

- Press F2 (F3). A dialogue box will appear, enabling you to enter the operand (tag).
- Enter the operand (tag) to be located and confirm by pressing ↵. The required operand (tag) will be displayed and highlighted.

- **Save allocation table**

- Press F9. The “Save allocation table” window will appear.
- Press ↵.



# Editors

---

**Notes**





# Processing Blocks

## Load block

A block must be loaded before it can be processed through the editor:

- Activate “Load block” from the “Off-line” menu. A selection window will appear.
- Highlight the required block type and confirm by pressing ↵. A window will appear, showing the available blocks.
- Using the arrow keys, highlight the block you wish to load and confirm by pressing ↵. The block will be loaded into the block editor and displayed.

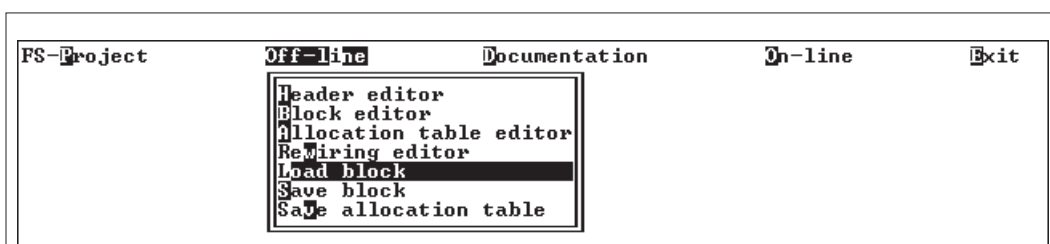


Fig. 5-1: Load block

## Save block

After a block has been processed in the editor it will be saved to the RAM on the programming device, but not to the hard drive. There are two ways of saving to the hard drive.

- Use the “Save block” command in the editor (see section entitled “Block editor”).
- Use the “Save block” command from the “Off-line” menu:
  - Select “Save block” from the “Off-line” menu. If the block is new, it will be saved. If an existing block has been amended, the following prompt will appear: “Overwrite block on disk Y/N?”.
  - Enter “Y” to save the block and overwrite the old version. Enter “N” to retain the old version. Change the name or number of the block in the header editor and then save again.

## Processing Blocks

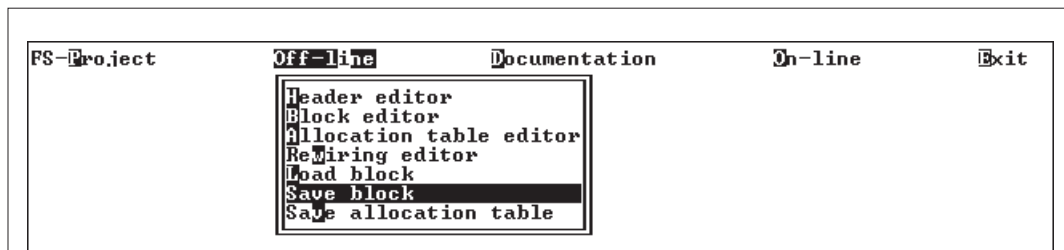


Fig. 5-2: Save block

### Display with/without long text

A text of a maximum 40 characters can be entered for each block instruction. The “Default settings” option determines whether or not this text is displayed in the block editor.

- Select “Default settings” from the “FS project”/“ST project” menu. A selection window will appear.
- Select “Display: with long text” if the texts are to be displayed. Select “Display: w/o long text” to suppress the display.

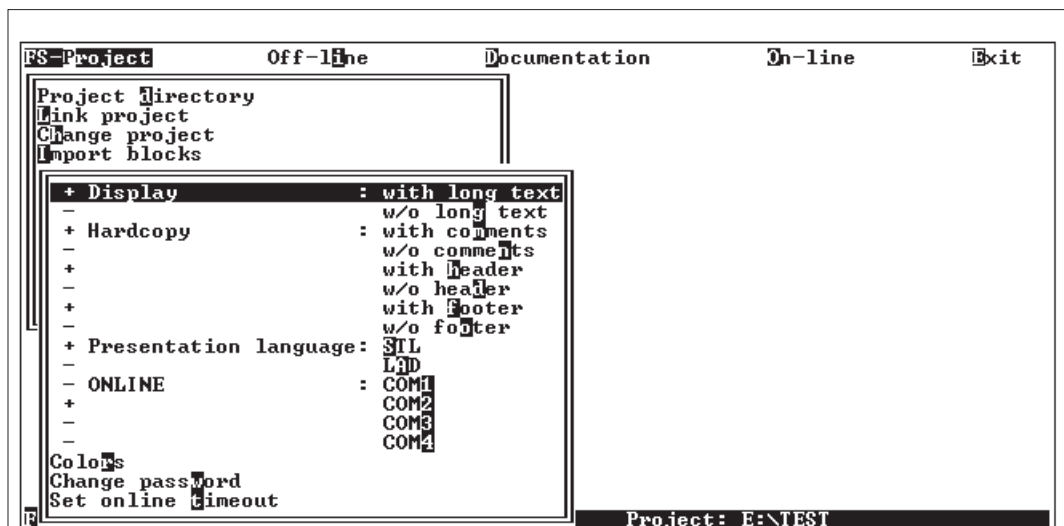
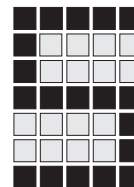


Fig. 5-3: Displaying a block with/without long text



## Copy block

A block can be copied by changing the name in the header editor:

- Load the block you wish to copy and call up the header editor.
- Enter a different number and/or type.
- Save the new block. The renamed block will be saved under the new name. The original block will be retained under the old name.

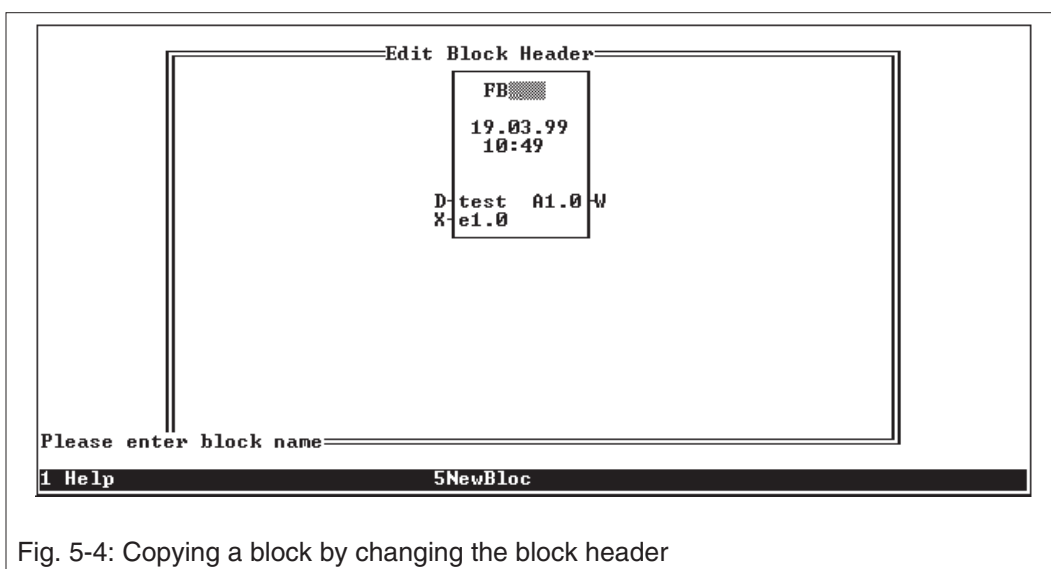


Fig. 5-4: Copying a block by changing the block header



### INFORMATION

Blocks should **not** be copied or renamed through MS-DOS because the name of the block is also stored within the block itself.

## Import block

Blocks from other projects can be imported into the current project:

- Select "Import blocks" from the "FS project"/"ST project" menu. A selection window will appear.

## Processing Blocks

The following options are available:

- "All blocks": all the blocks from a project
  - "All OB, PB, FB, SB, DB": only blocks of a certain type
  - "OB, PB, FB, SB with internal blocks": the selected block plus all the blocks called from within it
  - "Select OB, PB, FB, SB, DB": a specific block or several blocks
  - "Link allocation table": the allocation table from the current project is extended by adding an allocation table from another project. Any discrepancies will be eliminated via a menu-driven function
- Select an option. The project selection window will appear. Enter the directory of the project from which the blocks are to be imported and confirm by pressing ↵.
  - Depending on which option is selected, a window will appear, enabling you to select a block. Highlight the block you require and confirm by pressing ↵. Several blocks of one type can also be highlighted. Highlight the first block and press "+". Move the cursor to the next block to be highlighted and press "+" again. Continue until all the blocks you require are highlighted.

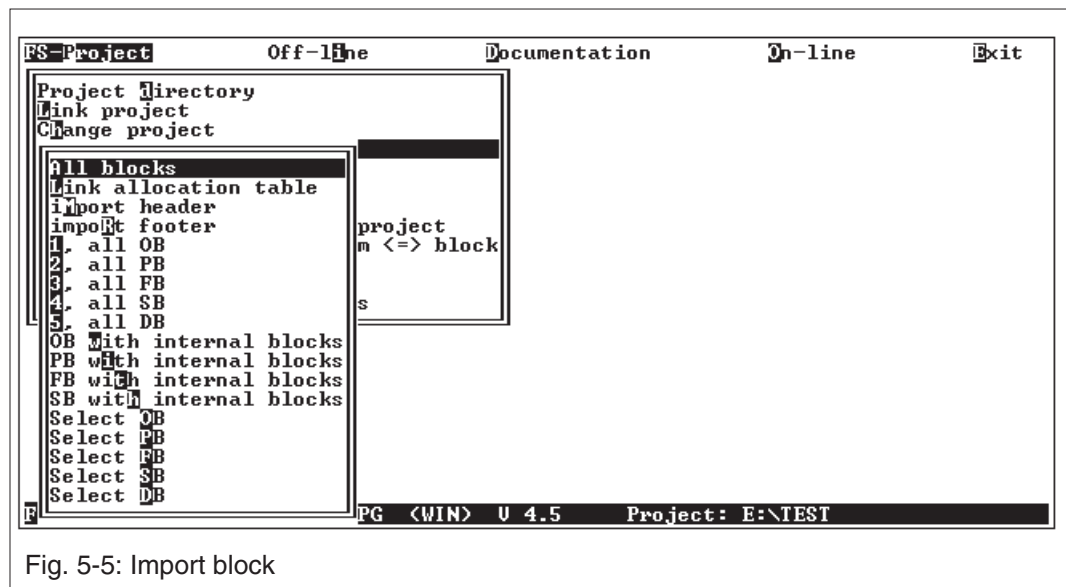
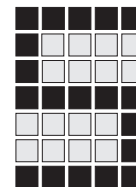


Fig. 5-5: Import block



## Compare blocks

The current block in the RAM can be compared with the block of the same name stored on the hard drive (block in project), or the block in the project can be compared with the block of the same name in the linked program. The second option is only available with FS programming.

- To compare the block in the RAM with the block in the project:  
Select “Block comparison: PG  $\Leftrightarrow$  project” from the “FS project”/ “ST project” menu. A selection window will appear.

**OR**

FS: To compare the block in the linked program with the block in the project: Select “Comparison: linked program  $\Leftrightarrow$  block” from the “FS project” menu. A selection window will appear.

- Select “Display first difference”. The first difference, if one exists, will be displayed with a message.
- Select “Display all differences”. The differences between the two blocks, if they exist, will be listed.

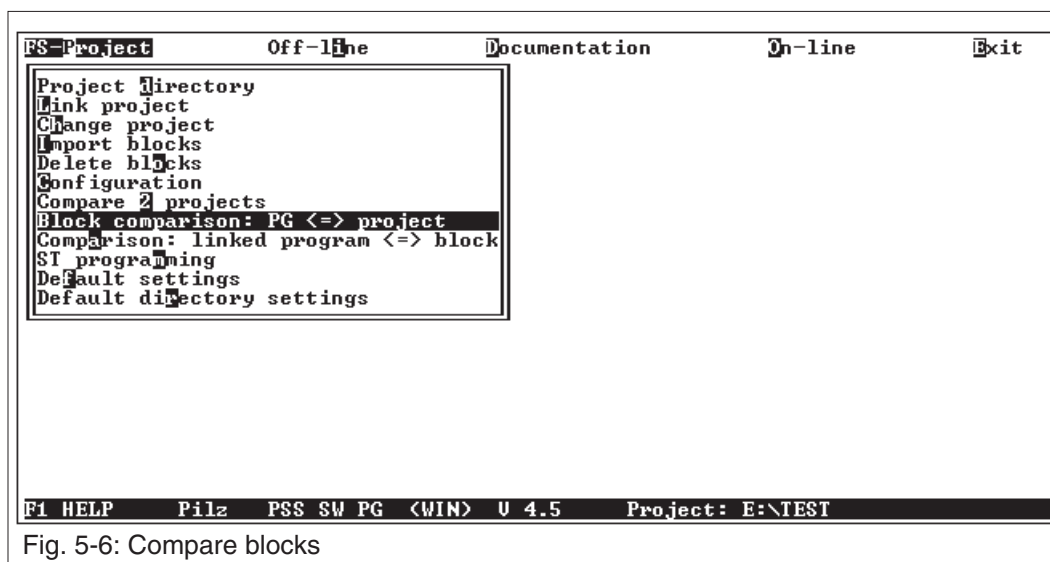


Fig. 5-6: Compare blocks

# Processing Blocks

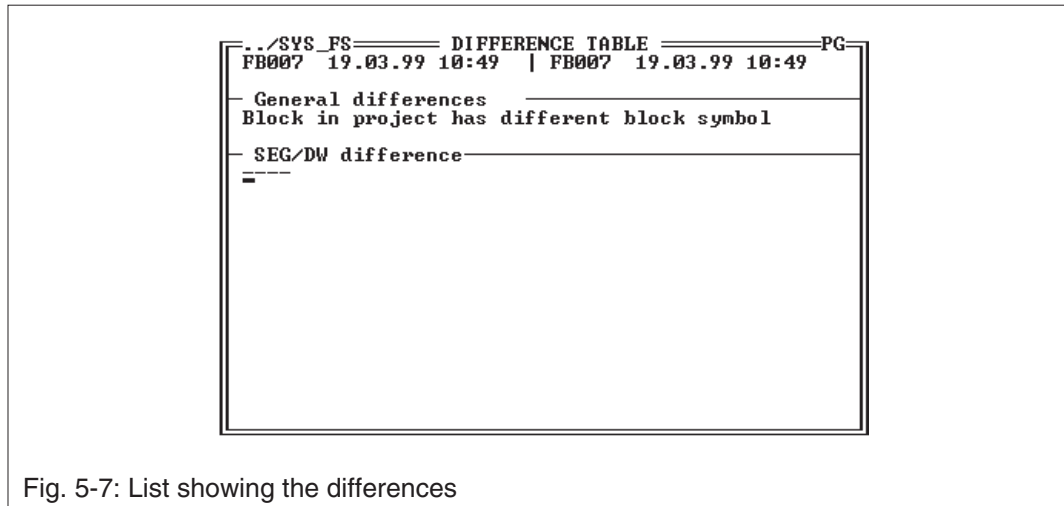


Fig. 5-7: List showing the differences

The list in Fig. 5-7 shows the numbers of the block segments and data words which have shown differences.

- Display differences  
Using the arrow keys, highlight the segment and press F6 "Code". Two windows show extracts of the highlighted blocks. The first difference will be highlighted. To return to the list of blocks / data words showing differences, press F5 "BS/DW".
- Print list of differences  
Press F8 for a print out of the list of differences.

## Delete block

You can choose to delete individual blocks, all the blocks of a particular type or every block.

- Select "Delete blocks" from the "FS project"/ "ST project" menu. A selection window will appear. The following options are available:
  - "All blocks": delete all the blocks in the project
  - "All OB, PB, FB, SB, DB": delete only blocks of a specific type
  - "Select OB, PB, FB, SB, DB": delete a specific block or several blocks.



- Depending on which option is selected, a window will appear, enabling you to select a block. Highlight the block you require and confirm by pressing ↵. Several blocks of one type can also be highlighted. Highlight the first block and press “+”. Move the cursor to the next block to be highlighted and press “+” again. Continue until all the blocks you require are highlighted.
- A prompt will appear: “Show report?”. Enter “Y” to display the deleted blocks.

When the block has been deleted you will receive the prompt “Undo deleted blocks? (Y/N)”. This gives you the opportunity to undo the deletion.

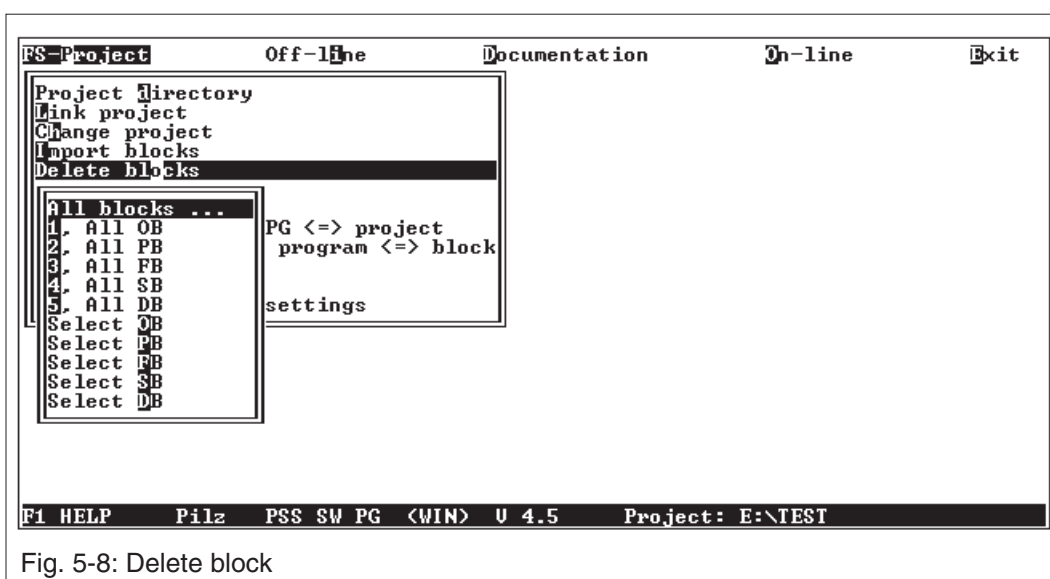
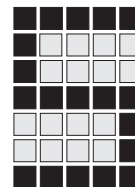


Fig. 5-8: Delete block

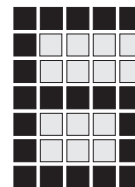


# Processing Blocks

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**Notes**





# Processing the Allocation Table

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## Allocation table

The allocation table contains a list of the operands assigned to each tag. Each project has an allocation table.

The allocation table is global. Allocations that are made will be valid for all the blocks in the project. This will ensure that an operand that is used in several blocks is always assigned the same tag.

The “Editors” chapter describes how the allocation table is generated, in the section entitled “Allocation table editor”. It also describes how to amend entries.

## Change tag and long text

An operand's tag can only be amended in the allocation table. Long texts may be amended in the allocation table as well as directly within a block.

Change tag and long text in the allocation table:

- Select “Allocation table editor” from the “Off-line” menu.
- Using the arrow keys, highlight the line containing the tag you wish to change.
- Press the tabulator key to highlight the tag.
- Edit the tag and switch to long text using the TAB key.
- Edit the long text and confirm by pressing ↵. The tag and long text will now be changed in the allocation table and in all the blocks.

Note: The check sum of an encrypted block remains the same even when tags and long texts have been changed.

# Processing the Allocation Table

---

## Change operand

An operand can be changed or rewired, e.g. from E3.00 to M70.04, through the rewiring editor.

### Procedure:

- Make a backup of your project. Rewiring cannot be undone!
- Select “Rewiring editor” from the “Off-line” menu.
- In the rewiring editor, use the arrow keys to move between the columns and lines in the table. Entries are completed by pressing ↵.
- In the “Operand” column, enter the operand you wish to change.

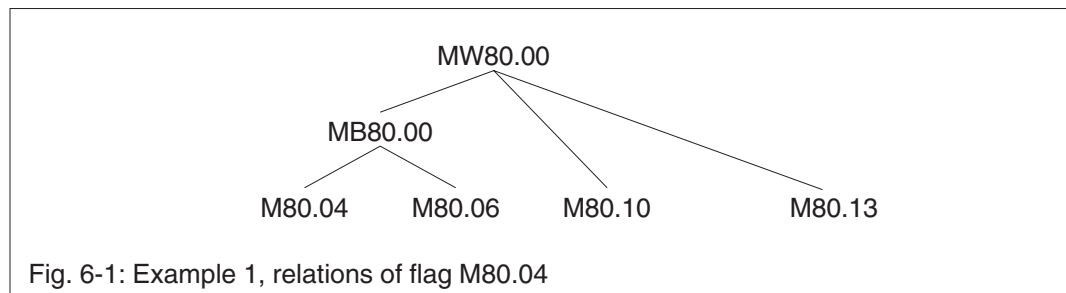
#### **You can only enter bits.**

If you wish to rewire a byte, enter a bit from this byte e.g. M87.03 for MB87.00.

As soon as you have entered an operand, the system will check to see which of the bit's “relations” are still used within the project. All relations will be entered in the “Operand” column.

“Relations” are bits, bytes and words which are used within the program and have a connection to the bit that has been entered.

Example: A program uses MW80.00, MB80.00, M80.04, M80.06, M80.10 and M80.13. M80.04 is entered as the operand during rewiring. All the relations shown in Fig. 6-1 will then be entered in the “Operand” column. If MW80.00 was not used within the program, the relations would be limited to those shown in Fig. 6-2.



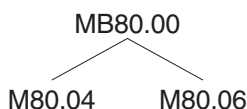
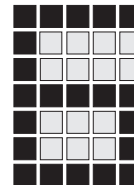


Fig. 6-2: Example 2, relations of flag M80.04

The “R” column shows whether operands have a cross reference, i.e. whether the operand is used within a block.

The “T” column shows whether operands are entered in the allocation table, or whether there is a tag for the operand.

- In the “Target” column, enter the new address the operand is to receive. You can only enter a new address for the first operand in the “Operand” column. The address of any relations will be calculated and entered automatically. It is not possible to amend these addresses. If you do not want one of the relations to be rewired, place the cursor in the corresponding line and press “Delete”. That relation will then be highlighted in colour, i.e. it is excluded from the rewiring. Note: It is possible that the target may have more relations than the operand. If this is the case, the “Target” field will contain addresses for which no operand is displayed. These addresses are shown for information only.

Operands excluded from the rewiring

FS-Project	Operand	R	T	Off-line	Target	R	T	Documentation	On-line	Errors	Exit
M	077.00	x	x	M	093.00						
MB	077.00	x	x	MB	093.00						
MW	077.00	x	x	MW	093.00						
M	077.01	x	x	M	093.01						
M	077.02	x	x	M	093.02						
M	077.03	x	x	M	093.03						
M	077.04	x	x	M	093.04						
M	077.05	x	x	M	093.05						
M	077.06	x	x	M	093.06						
M	077.07	x	x	M	093.07						
M	077.08	x	x	M	093.08						
M	077.09	x	x	M	093.09						
M	077.10	x	x	M	093.10						
M	077.11	x	x	M	093.11						
M	077.12	x	x	M	093.12						
M	077.13	x	x	M	093.13						
M	077.14	x	x	M	093.14						
M	077.15	x	x	M	093.15						

1 Help      4 Tag      5 CrossRe      6 Test      7 Error

Fig. 6-3: Rewiring editor

## Processing the Allocation Table

---

- If you would like to rewire more operands, these can be entered at the end of the “Operand” column. These can only be operands that were previously disabled in the “Operand” column or that are not yet shown in the “Operand” column.  
However, we recommend that at this stage you only rewire one operand plus its relations.
- When you have entered all the required rewirings in the table, press F6. The rewirings will be checked for feasibility. If errors occur, these will be displayed in the “Errors” column.

- **If no errors are displayed,**  
you can continue with the next point.

**If errors have been displayed,**

move the cursor to the target in the line that is displaying the error and press F7.

An explanation of the error will then be provided.

Key to errors:

**"S":** Syntax error

For example, if you want to rewire a flag to an input and that flag is written to within the program, you will get a syntax error because it is not permitted to write to an input.

**"B":** Invalid bit address

Error message if rewiring does not fall within the target address range (see also the section entitled “Notes on rewiring”, “Exceeding the range”).

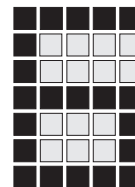
**"U":** Entry incomplete

Error message when no target has been entered.

Press “Esc” and rectify the error. Alternatively, you can also exclude the line from the rewiring (highlight line and press “Delete”).

Then repeat the test by pressing F6, to display any remaining errors. All errors will have to be rectified before you can progress to the next point.

- You will now have to select the rewiring mode, i.e. decide whether all blocks are to be rewired or just specific blocks.



---

**If all blocks are to be rewired,**

press F3. A window will be displayed, showing which blocks are affected. Press F10 to undertake the rewiring.

All blocks will be rewired and the allocation table will be adapted accordingly. In the allocation table, each new address will receive the tag from the old operand.

**If only specific blocks are to be rewired,**

press F8. A window will be displayed, showing which blocks are affected. You can now select from the list the blocks that are to be rewired.

Use of keys:

“+”, “Del”: A block is selected by highlighting the block and pressing “+” or “Delete”. Press the key a second time to deselect the block.

“i”: If all blocks are to be rewired except for those highlighted, simply press “i” to invert the selection.

Press F10 to undertake the rewiring.

Only the selected blocks will be rewired and the allocation table will be unchanged.



**NOTICE**

You should check each affected block to make sure that the rewiring has been performed correctly.

# Processing the Allocation Table

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## Notes on rewiring

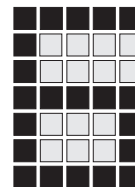
- Restrictions on rewiring:
  - Only operands of the same type can be rewired, i.e. bit to bit, byte to byte etc.
  - Timers (T), counters(Z, ZW), PB, PW, XW cannot be rewired.
  - Flags for indirect addressing (M114.00 ... M114.31) cannot be rewired.
  - During FS programming, only operands from the FS section can be rewired. The same is true for ST programming.
  - In a program, if all bits from a byte/word are to be rewired, but the byte/word is not used within the program, all bits must be rewired individually.  
Example: Flags M80.00 ... M80.07 are used in the program, but not MB80.00 and MW80.00. If flags M80.00 ... M80.07 are now to be rewired to M90.00 ... M90.07, for example, all bits will have to be entered individually. However, they can be rewired in one step.
  - Operands in encrypted blocks cannot be rewired.
- Tags

If an operand or target has a tag, this will be shown by an “x” in the “T” column. If you highlight the operand or target and press F4, the tags will be displayed.
- Cross references

If an operand or target has cross references, this will be shown by an “x” in the “R” column. If you highlight the operand/target and press F5, a list will be displayed showing all the blocks/segments in which the operand/target appears.

If you highlight a block in this list and then press F7, you will jump directly to the block editor. There you will see the program text, which you will be able to process as usual.

Note: If you display an operand's cross references after rewiring, the points in the program where the old operand stood will be displayed.



- Allocation table

If you select rewiring mode “F8: Selection” (rewire selected blocks), the allocation table will not be amended. The allocation table will only be amended if rewiring mode “F3: All Blocks” (rewire all blocks) is selected. When the allocation table is changed, the new address receives the tag from the old operand.

- Test pulses

If inputs are rewired, the test pulse configuration must be adapted afterwards in the configurator.

- Periphery access

If inputs/outputs are rewired that can also be accessed via PB or PW, periphery access must be adapted afterwards.

- Permitted address range

The only test is to check whether the stated operands and target are possible in principle. There is no test to check whether the address actually exists (e.g. whether an input card is entered in the registered hardware). Such a test is only performed in the FS section when the program is linked, and is not performed at all in the ST section.

- Exceeding the range

If words have been established that exceed the actual address range of a flag, for example, then bits, bytes and words from the bordering address range will be counted among its relations.

Example: If a program contains flag word MW81.24, its relations will include flags M82.00 ... M82.07 and flag byte MB82.00, in addition to flags M81.24 ... M81.31 and flag byte MB81.24. If flag word MW82.00 is also to be used in the program, flags M82.08 ... M82.15 and flag byte MB82.08 will also be counted.

If operand M81.26 and all its relations are to be rewired, for example, certain configurations may result in invalid targets, and the error “B” will be registered. The lines in which the error is registered must then be excluded from the rewiring (highlight line and press “Delete”).

Note: Flag words beginning with bit number 8 or 24 slow down the application program and should not be used.

# Processing the Allocation Table

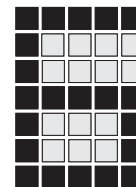
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## Examples

### **Example 1: Rewiring an operand including its relations**

An input module is to be moved from slot 1 to slot 3. All used inputs, input bytes and input words must be rewired accordingly.





### Allocation table before:

Operand	Tag	Long-Text
E 1.00	E-Stop0	
E 1.01	E-Stop1	
E 1.05	E-Stop5	
EB 1.00	E-Stop_EB00	
EW 1.00	E-Stop_EW00	

### Program before:

```

:
:L   E 1.00   .E-Stop0
:U   E 1.01   .E-Stop1
:U   E 1.05   .E-Stop5
:S   M 080.00
:
:
:L   EB 1.00   .E-Stop_EB00
:T   MB 083.00
:
:
:L   EW 1.00   .E-Stop_EW00
:T   MW 085.00
:

```

### Rewiring:

Operand	R-T	Target	R-T
E 1.00	x x	E 3.00	
EB 1.00	x x	EB 3.00	
EW 1.00	x x	EW 3.00	
E 1.01	x x	E 3.01	
E 1.05	x x	E 3.05	

### Allocation table after:

Operand	Tag	Long-Text
E 3.00	E-Stop0	
E 3.01	E-Stop1	
E 3.05	E-Stop5	
EB 3.00	E-Stop_EB00	
EW 3.00	E-Stop_EW00	

### Program after:

```

:
:L   E 3.00   .E-Stop0
:U   E 3.01   .E-Stop1
:U   E 3.05   .E-Stop5
:S   M 080.00
:
:
:L   EB 3.00   .E-Stop_EB00
:T   MB 083.00
:
:
:L   EW 3.00   .E-Stop_EW00
:T   MW 085.00
:

```

Fig. 6-4: Rewiring, example 1

# Processing the Allocation Table

## Example 2: Rewiring an operand to one of its relations

Flag M80.00 is to be rewired to M80.05. MB80.00 is also used in the program. In this case, proceed with the rewiring as follows:

- Enter M80.00 as an operand
- Among the relations, disable M80.05
- Enter M80.05 as the target

### Allocation table before:

Operand	Tag	Long-Text
M 080.00	E-Stop1	
M 080.05	Safety_Gate1	
MB 080.00	Plant	

### Program before:

```

:
:L   M  080.00  .E-Stop1
:S   A  3.00
:
:L   M  080.05  .Safety_Gate1
:S   A  3.06
:

```

### Rewiring:

Operand	R	T	Target	R	T
M 080.00	x	x	M 080.05	x	x
MB 080.00	x	x	MB 080.00	x	x
M 080.05	x	x	M 080.10		
			M 080.00	x	x

### Allocation table after:

```

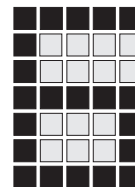
:
:L   M  080.05  .E-Stop1
:S   A  3.00
:
:L   M  080.05  .E-Stop1
:S   A  3.06
:

```

### Program after:

Operand	Tag	Long-Text
M 080.05	E-Stop1	
MB 080.00	Plant	

Fig. 6-5: Rewiring, example 2



---

## Import allocation table

The allocation table from the current project will be linked with the allocation table from a selected project.

- Select “Import” from the “FS project”/“ST project” menu. A window will appear.
- Select “Link allocation table”. The project selection window will appear.
- Select the project from which the allocation table is to be imported and confirm by pressing ↵. The allocation table from the current project will be expanded to include the allocations from the selected project.

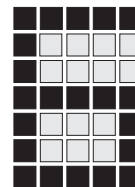
If there are discrepancies between the two tables a list will appear, showing the different allocations that are causing the conflict. The following methods can be used to remove these conflicts:

- Change the allocations in the table: press F7. A line editor will appear.
- Accept the allocations from the selected project: press F8.
- Accept the allocation from the current project: press F6.
- Abort the link between the allocation tables: press F4.

## Save allocation table

When an allocation table has been processed using the editor, the allocation table is saved to the RAM of the programming device but not to the hard drive. Two commands are available for saving to the hard drive:

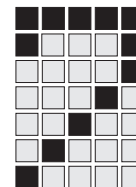
- “Save allocation table” command in the editor (see section on the allocation table editor)
- “Save allocation table” command in the “Off-line” menu.
  - Select “Save allocation table” from the “Off-line” menu. If the allocation table is new it will be saved. If it is an existing allocation table, a prompt will appear: “Overwrite allocation table on disk Y/N?”
  - Enter “Y” to save the allocation table and overwrite the old version on the hard drive. To retain the old version, enter “N”.



# Processing the Allocation Table

---

Notes



# Working on a Project

## Directory

The directory is a list of all the blocks in the current project. If the blocks do not fit into the window provided, press any key to scroll upwards.

- To display the contents of the directory select “Project directory” from the “FS project”/“ST project” menu.
- Press “ESC” to close the window.

FS-Project		Off-line		Documentation		On-line		Exit	
Directory of project: U:\RWNDR_FS									
Linked progr : RWNDR_FS		11.05.99		CRC: 05DE		CURRENT			
OB		FB		PB		SB		DB	
101 Main Prg		010 Jog Time		001 E-STOPS		050 FMBS->ST		002 SYS-DB2	
11.09.98		20.09.98		21.09.98		10.03.97		11.05.99	
120 Initlse		011 PreStart		002 GATES		051* BA_iaus8		015 errors	
30.03.98		21.09.98		21.09.98		22.05.96		14.07.97	
				010 Jog Sel.		061* NA_1			
				21.09.98		07.01.97			
				011 Jog Cntl		066* ST_K4			
				21.09.98		05.06.97			
				020 Outputs		067* RFK_K4			
				21.09.98		30.05.97			
						070* INIT_MBS			
						22.08.96			
						255* CallFsBs			
						04.05.95			
F1 HELP Pilz PSS SW PG Project: RWNDR_FS									

Fig. 7-1: Project directory

Fig. 7-1: Project directory

You can select the block details that are displayed in the directory and the way in which the details are sorted.

Select “Default directory settings” from the “FS project”/“ST project” menu. A selection window will appear. You can select between the following settings:

- “with / w/o name”: blocks are displayed with/without their names
- “with / w/o date”: you can choose to display/not display the date on which the block was created

## Working on a Project

- “with / w/o ABS”: blocks that have been approved by BG or TÜV are marked/not marked with “\*”
- “with name sort / w/o name sort”: in the directory, blocks will either be sorted by name or by number.  
If blocks are displayed without their name, they will automatically be sorted by number.

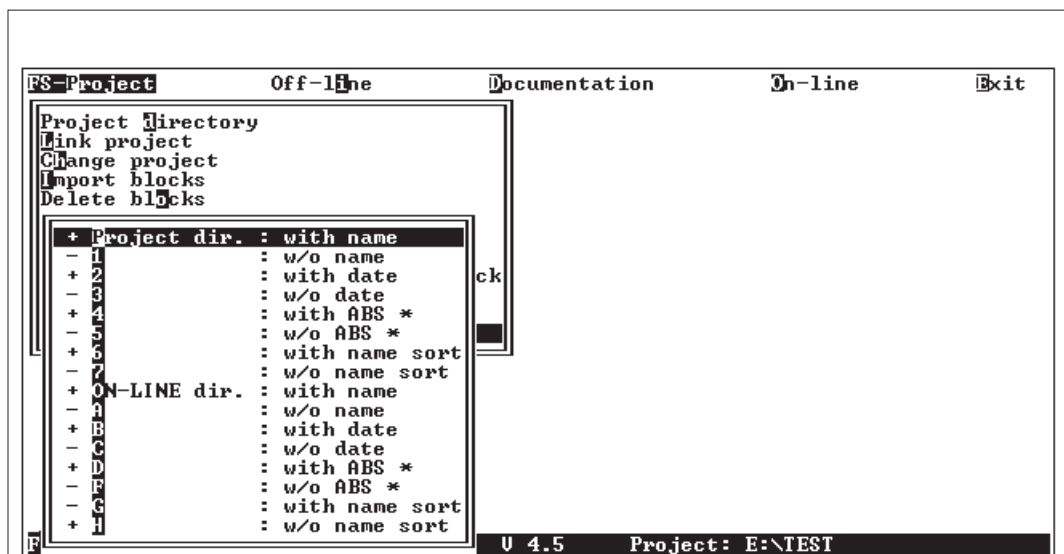


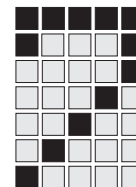
Fig. 7-2: Default settings for displaying the directory

## Change project

When you start up the system software, the last project you worked on will automatically be loaded. This information is stored in the file called PPROJEKT.SET. If the system cannot find this file or if the file does not contain any project names, the menu item “Change project” will automatically be activated. This option allows you to select an existing project and create a new project.

### • Select project

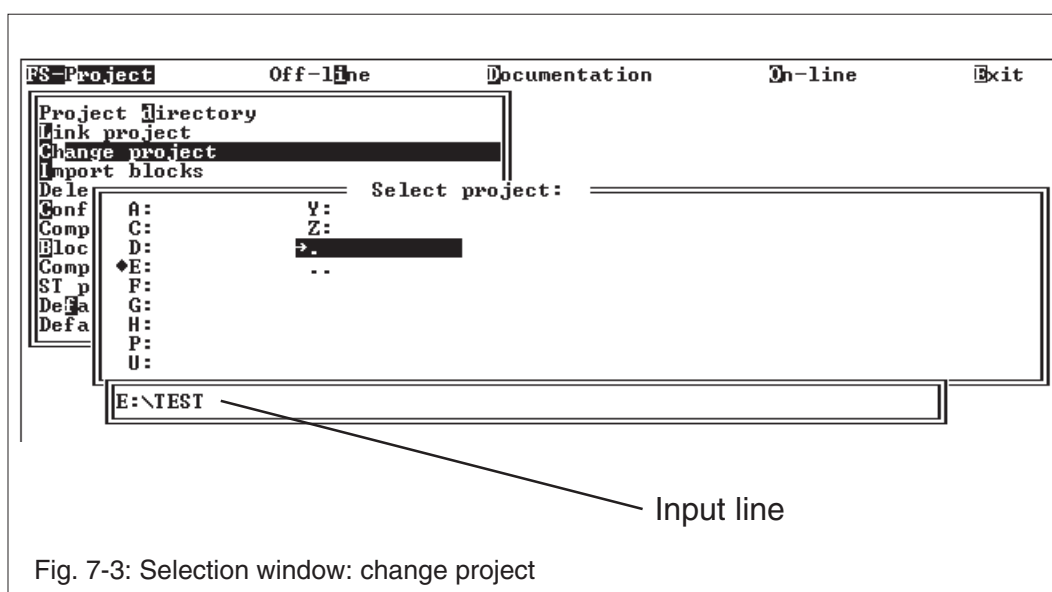
- Select “Change project” from the “FS project”/“ST project” menu. A selection window will appear.
- Switch drive: Highlight the line showing the required drive designation and press ↵.



- Change path:
  - Back one level: Highlight the “..” line and press ↵;
  - Forward one level: Highlight the line with the path name and press ↵.
- Select project: Highlight the “→” line and press ↵.

### • Create project

- Select “Change project” from the “FS project”/“ST project” menu. A selection window will appear.
- Press “TAB”. The cursor will move to the input line.
- Enter the path and name you require and confirm by pressing ↵.
- The prompt “Install new project (Y/N)” will appear. Enter “Y” and confirm by pressing ↵.



## Shell

PSS SW PG system software for MS-DOS only:

The “Shell” option from the “FS project”/“ST project” menu activates the operating system without quitting the system software. To exit the operating system and return to the system software enter the command “exit.↵”. Please note that this option is not available under Windows NT.

## Working on a Project

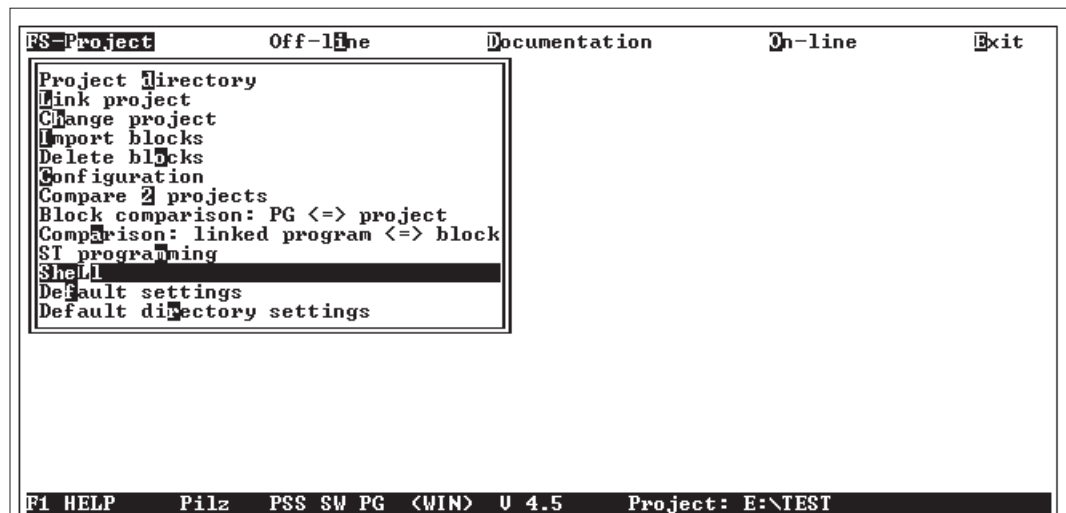


Fig. 7-4: Switching to the operating system



### NOTICE

Do not call up any memory-resident programs.

A program that is called up must restore any interrupt vectors it has altered before quitting, otherwise the computer might crash when the program is exited.

## Compare projects

When two projects are compared, the blocks within the projects are listed opposite each other and the differences displayed.

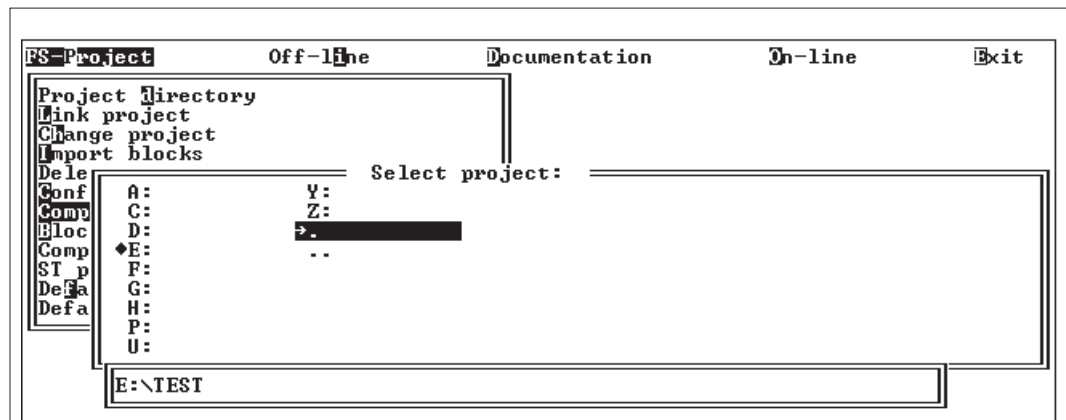
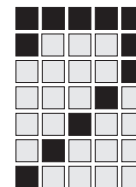


Fig. 7-5: Compare projects





## Procedure

- Select “Compare 2 projects” from the “FS project”/“ST project” menu. The project selection window will appear. The current project will already be entered.
- Enter the path and name of the project to be compared with the current project and confirm by pressing ↵. A selection window will appear.

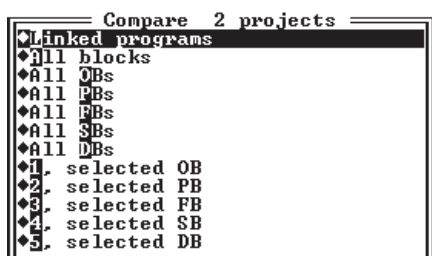


Fig. 7-6: Selection window: compare projects

- “Linked programs” (only with FS)  
The linked programs from two projects will be compared.
- “All blocks”:  
All the blocks within the two projects will be sorted by block type and compared. Any differences will be displayed in a list showing the date and time the blocks were created.
- “All OBs (PBs, FBs, SBs, DBs)”:  
All the blocks of the selected type within the two projects will be compared. Any differences will be displayed in a list showing the date and time the blocks were created.
- “Selected OB (PB, FB, SB, DB)”:  
Specific blocks from the two projects will be compared. The differences within the blocks will be displayed in a list.
- Display the differences in individual blocks
  - Highlight the block to be examined.
  - Display the numbers of the different block segments and data words by pressing F5 “SEG/DW”.
  - Highlight the block segment (data word) to be examined.
  - The selected segments can be viewed in two windows by pressing F6 “Code”. The first difference will be highlighted.

## Working on a Project

---

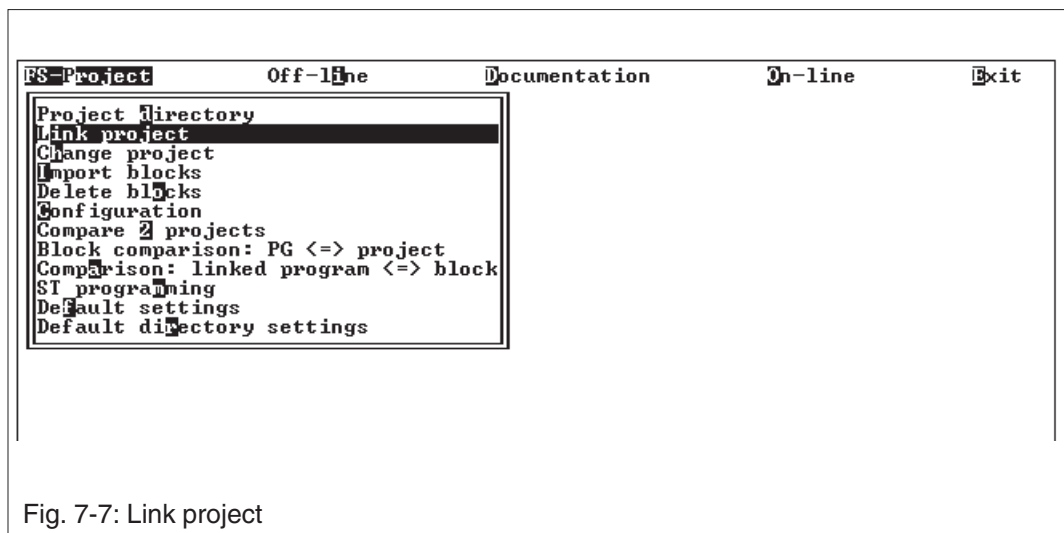
- Press F5 “SEG/DW” to return to the list with the different block segments and data words.
- Press F4 “BS” to switch from the list of block segments and data words to the list showing the different blocks.
- This process can be repeated as often as necessary.
- Print list of differences  
Press F8 “PRINT” to print out the list of differences.

### FS: Link project

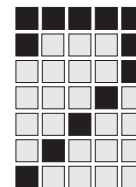
An FS project must be linked before it is transferred to the PSS system.

#### Procedure

- Select “Link project” from the “FS project” menu.  
The individual blocks will be linked together and saved as a compiled program.



Any errors the programming device detects during the linking process will be displayed in a project link report.



## FS: Compare project with linked program

The current FS project is compared with the linked version of the current FS project.

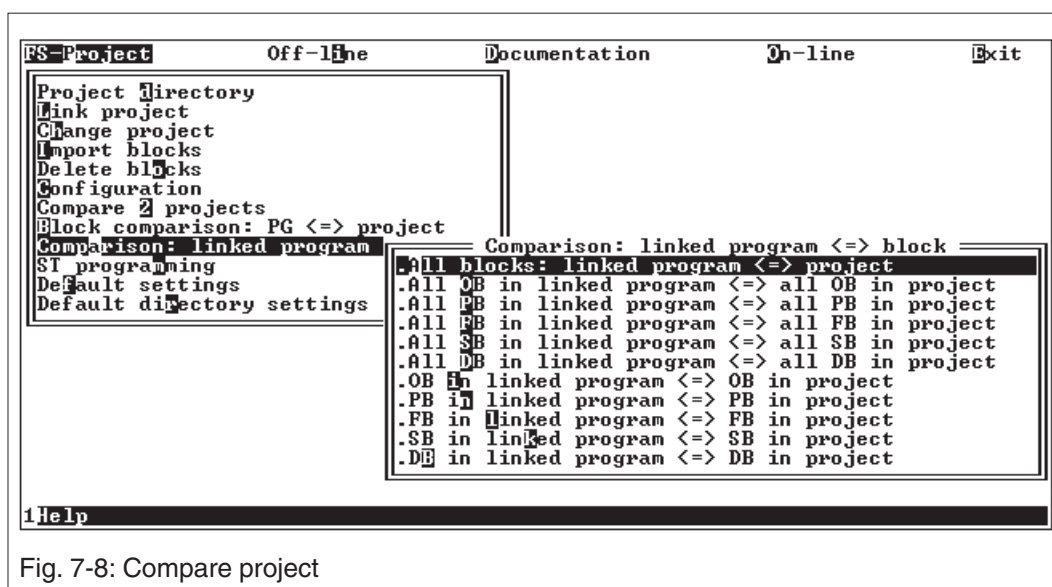
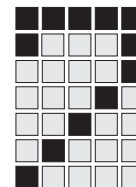


Fig. 7-8: Compare project

Select "Comparison: linked program <=> block" from the "FS project" menu. A selection window will appear.

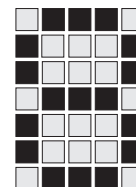
- "All blocks: linked program <=> project"  
All the blocks from the current project will be compared with those from the relevant linked program and the differences displayed.
- "All OB (PB, FB, SB, DB) in linked program <=> all OB (PB, FB, SB, DB) in project"  
All the blocks of the selected block type in the current project will be compared with those from the linked program.
- "OB (PB, FB, SB, DB) in linked program <=> OB (PB, FB, SB, DB) in project"  
When you select the block type a selection window will appear, showing all the available blocks of the selected type. A specific block from the current project will be compared with the block from the linked program. The result of the comparison can be displayed, showing either the first difference or all the differences in list format.



## Working on a Project

---

**Notes**



# FS Configurator

The configuration of the PSS safety system must be entered to allow communication between the operating system and the failsafe section. The following sections describe the configuration process for the PSS, PSS with selective shutdown and PSS with SafetyBUS p.

## PSS configuration

The programming device contains a configurator to enable you to configure your PSS. The necessary data is entered in a number of dialogue boxes and is then stored in data block DB 002.

### Call up:

Select "Configuration" from the "FS project" menu. If you are working on a project which has already been configured, a window will appear, showing the configuration menu (Fig. 8-1).

If you are carrying out the initial configuration for your project you will be asked to enter the PSS type and registered hardware before the configuration menu appears.

The menu will depend on the PSS type and registered hardware you have selected.

A window will display the PSS type, whether the PSS has any special function (selective shutdown, SafetyBUS p etc.) and, where relevant, the number of the configuration DB.

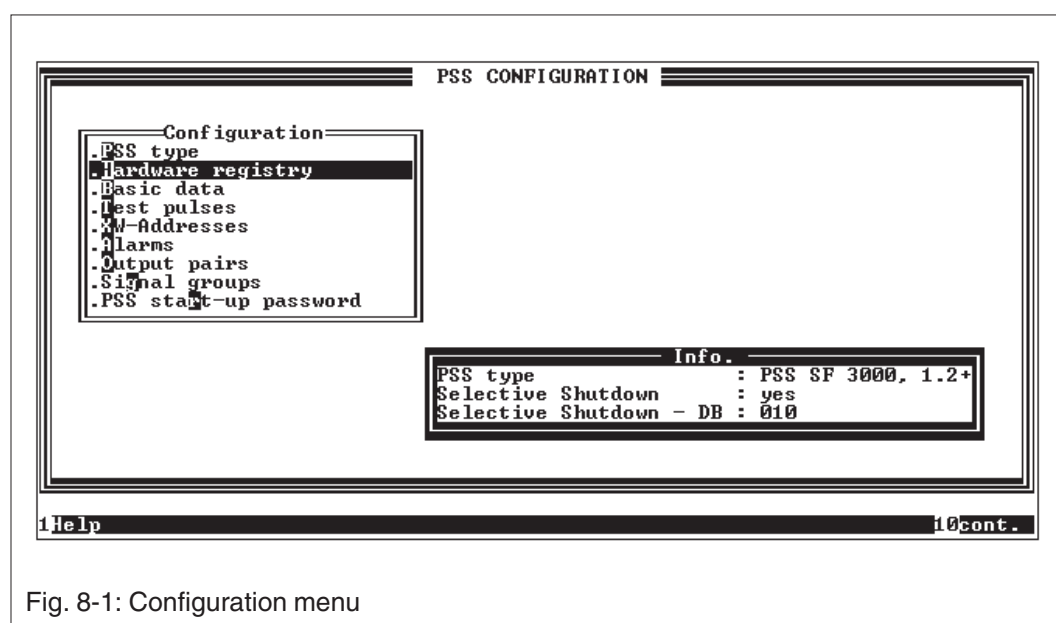


Fig. 8-1: Configuration menu

# FS Configurator

---



## INFORMATION

When entering or amending the configuration, you should always follow the sequence given below. This is to ensure that all the options that need to be configured for the PSS are displayed in the configuration menu and in the dialogue boxes:

- PSS type
- Hardware registry
- Basic data
- Test pulses
- XW addresses
- Alarms
- Start-up password

## Set PSS type

The programming device can be used to create projects for all the PSS systems in the Pilz range. Enter the PSS type you are using under “PSS type”.

### Procedure:

- Select “PSS type” from the “Configuration” menu.  
A dialogue box will appear (Fig. 8-2).
- Highlight the line showing the PSS type you are using and confirm by pressing ↵.
- Depending on the PSS type you have selected, you may be asked for your PSS version number. If you are using a PSS with special functionality (selective shutdown, SafetyBUS p etc.), additional entries will be required. These are described in the sections entitled “Configuring the PSS with selective shutdown” and “Configuring the PSS with SafetyBUS p”.  
Make your entries as described on page 3-6 under “Entering data in the dialogue boxes”.
- Exit the dialogue box.

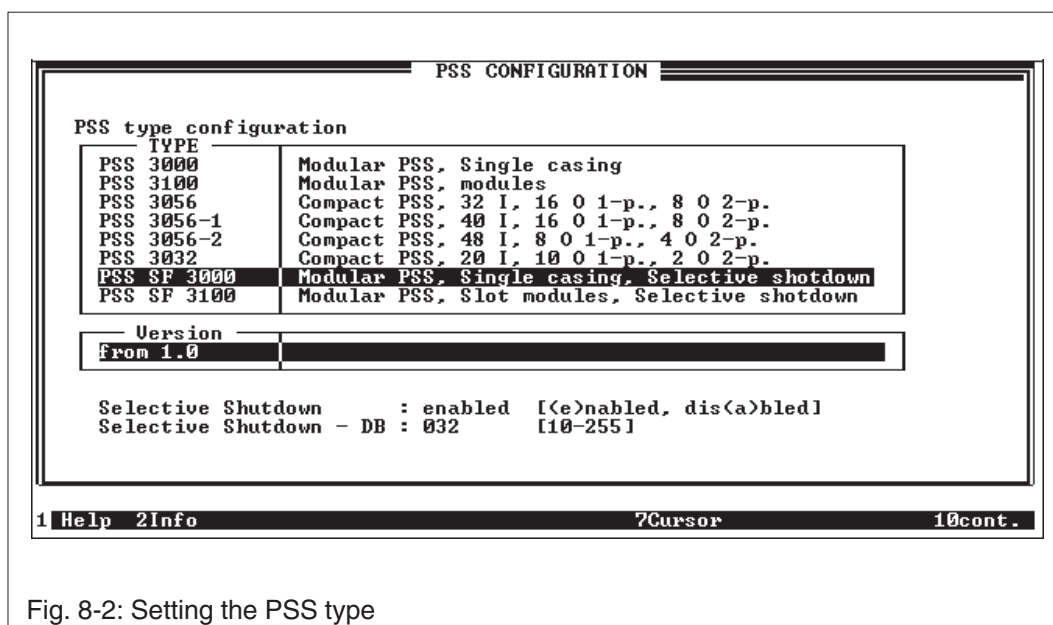
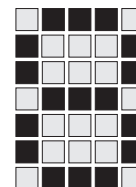


Fig. 8-2: Setting the PSS type

## Hardware registry

The hardware registry must be configured for modular PSS systems. This determines which slots modules are placed in. With compact PSS systems you can display but not amend the hardware registry.

### Procedure:

- Select "Hardware registry" from the "Configuration" menu. A dialogue box will appear (Fig. 8-3). The contents will depend on which PSS type has been selected.
- Highlight the line containing the slot to which a module is to be allocated, and press ↵. A window will appear, showing all the available modules.
- Select the module you wish to allocate to the slot and it will be entered under the selected slot.

Repeat the process until you have entered all the modules.

# FS Configurator

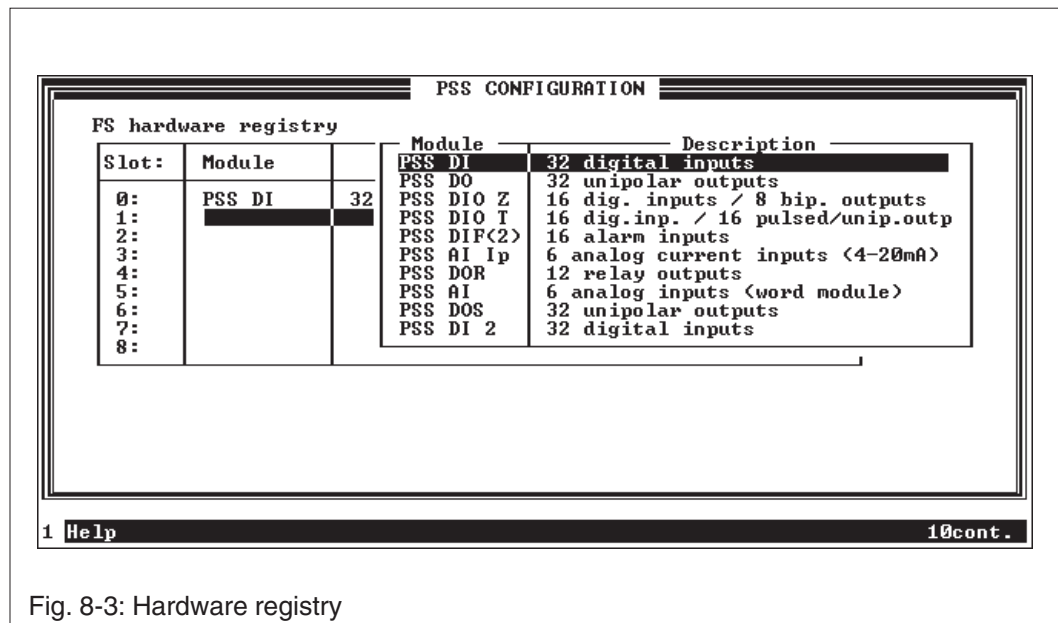


Fig. 8-3: Hardware registry

## Changing the hardware registry:

Follow the instructions given under “Procedure” or delete the entries by pressing “DEL”.

## Deleting an entry:

Highlight the entry and press “DEL” or F8.

If necessary, the last entry to be deleted can be restored by pressing F3.

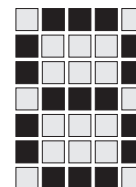
## Basic data

These include:

- Block run time
- Minimum scan time
- Number of attempts to compare the process image of inputs (PII)
- DI test time
- Maximum alarm reaction time

The settings that need to be made will depend on the PSS type you have selected and the hardware registry. Permitted values are shown in square brackets on the right-hand side. Further information regarding these parameters can be found in your PSS System Description.





### Procedure:

- Select “Basic data” from the “Configuration” menu.

A dialogue box will appear. The contents will depend on the PSS type selected and on the hardware registry.

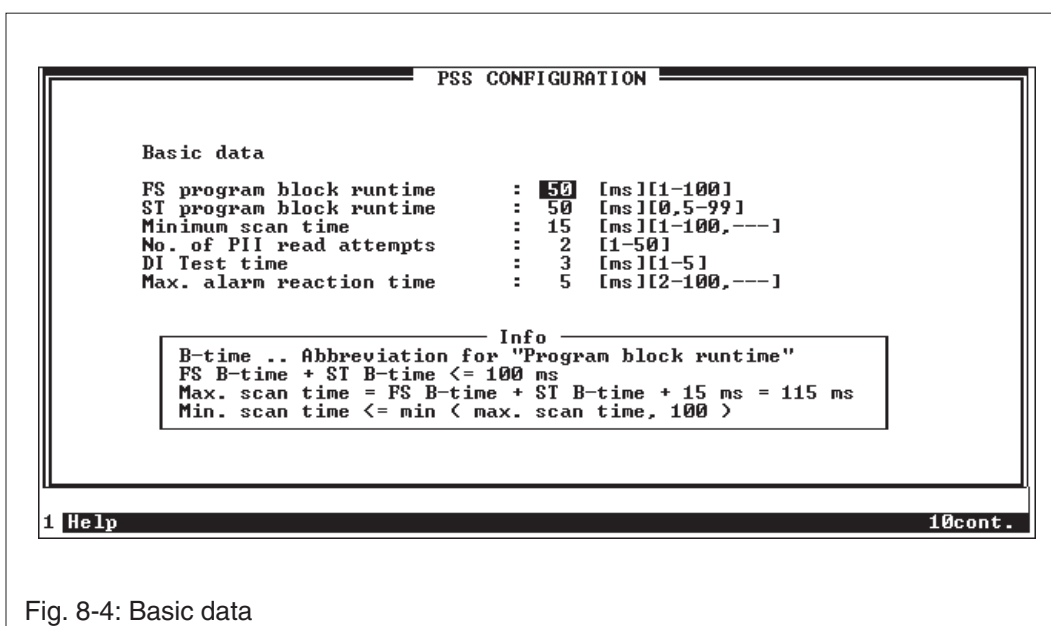


Fig. 8-4: Basic data

- Highlight the entry you wish to change and enter a value.
- Exit the dialogue box.

## Test pulse allocation

This dialogue box establishes the allocation of test pulse outputs and inputs.

### Procedure:

- Select “Test pulses” from the “Configuration” menu.

A dialogue box will appear.

# FS Configurator

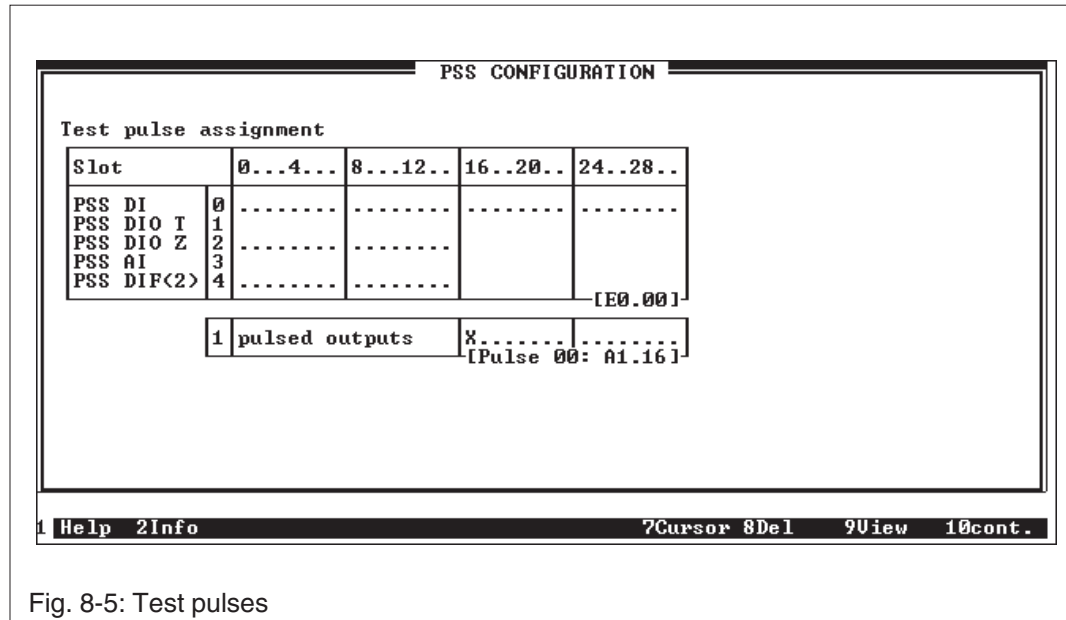


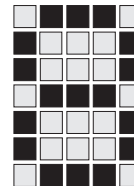
Fig. 8-5: Test pulses

Test pulses need to be allocated for the DIO T module, the slot for which is indicated in the lower dialogue box. If several pulse modules are available you can press F5 to select a different DIO T module to be used to provide the test pulses.

- Highlight a pulsed output from the “pulsed outputs” line. The output you select will be marked with an “X”.
- Use the TAB key to move to the table showing the individual modules and use the arrow keys to move the cursor to the input that is to be allocated to the selected pulse. Press ↵. The input will be marked with an “X”. Repeat the process for each input that is to be allocated to the test pulse. Please note that only those inputs marked with a bullet point can be wired with a test pulse.
- Repeat the process for each test pulse.

## Change format:

If a test pulse output in the lower dialogue box is selected, that output and its related inputs will be marked with an “X”. The other test pulse outputs and their relevant inputs will likewise be labelled with identical figures or letters. To obtain an overview of the inputs allocated to a test pulse output, highlight the output and press F9. All the other test pulse outputs and corresponding inputs will be shown with “\*”. Press F9 again to return to the previous format.



---

### **Poll information about a test pulse output:**

Highlight the output and press F2. A window will appear, showing the address of the test pulse output and listing all the inputs that are pulsed with it.

### **Poll information about an input/output:**

Highlight an input or output in the upper table and press F2. A window will appear, showing the following information:

- Module on which the input or output is located
- Address of the input or output
- If relevant, the signal group to which the input or output belongs
- If relevant, the tolerance type of the signal group
- If relevant, the test pulse output connected to the input.

### **Delete entry:**

Highlight the entry and press “DEL” or F8.

## **XW addresses**

When using word modules, this dialogue box is used to set the parameters for reading and writing words (please refer to the FS System Description in the System Manual).

### **Procedure:**

- Select “XW addresses” from the “Configuration” menu.

A dialogue box will appear.

# FS Configurator

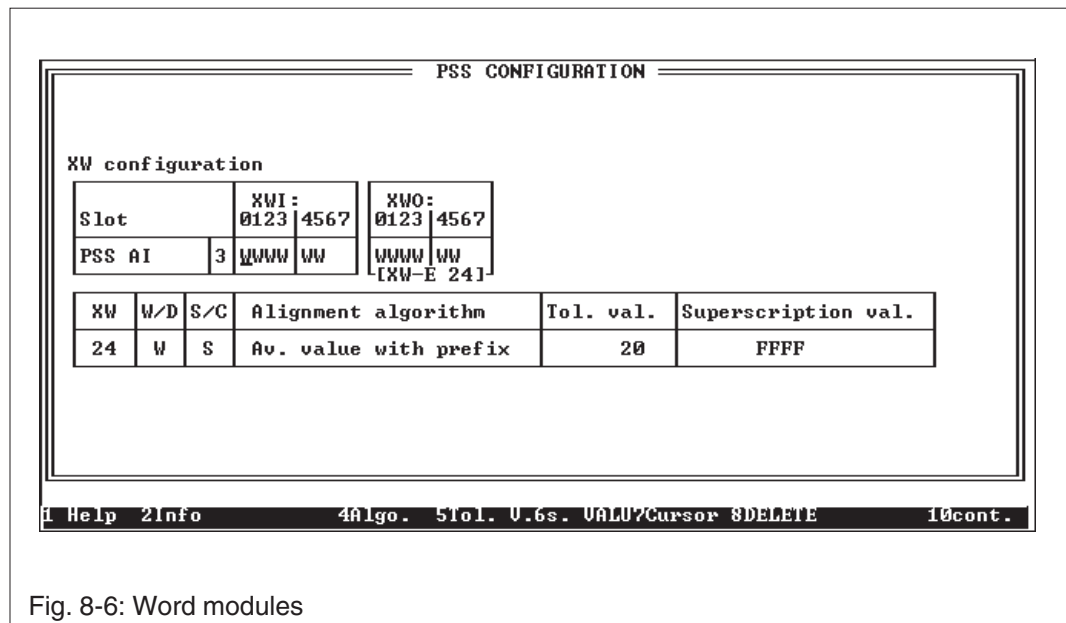
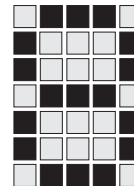


Fig. 8-6: Word modules

## Define the read segments:

- Highlight a word in the “XWI” column of the allocation table (top left). A table will appear, enabling you to enter a number of parameters. Use the TAB key to move between the two tables. Within the tables themselves, move between the cells using the arrow keys ← and →.
- Enter/change values:  
The parameters “Slot” and “XW Address” cannot be changed. They are fixed according to the word that is highlighted.
  - Length in words: Highlight the letters in the “W/D” column. Each time you press ↵ the display will switch between “D” and “W”. Select “W” for a word or “D” for a double word. If you want to define a double word, the first word of the double word must be highlighted in the allocation table. When you select a double word, make sure that you configure both the current word and the word following it.
  - Read-in point: Highlight the letters in the “S/C” column. Each time you press ↵ the display will switch between “S” and “C”. Select “S” to read in data at each scan change or “C” to read data only after the operating system has been called.



- Alignment algorithm: Highlight the entry in the “Alignment algorithm” column. Each time you press ↵ the display will scroll between the available alignment modes:
  - Verify
  - Min. value w/o prefix
  - Av. value w/o prefix
  - Max. value w/o prefix
  - Min. value with prefix
  - Av. value with prefix
  - Max. value with prefix
- Tolerance window: Highlight the entry under “Tol. val.”. Enter the max. deviation permitted for the words that are read in. No value is required in the tolerance window for the “Verify” algorithm.
- Overwrite value: PSS systems using selective shutdown must have overwrite values for the read-in segments. Highlight the entry under “Superscription val.” and enter the value.



#### **NOTICE**

A correct overwrite value is essential for plant safety and must therefore be configured for each read-in segment.

#### **Define the output segments:**

- Highlight a word in the “XWO” column of the allocation table (top right). A table will appear, enabling you to enter a number of parameters. Use the TAB key to move between the two tables. Within the tables themselves, move between the cells using the arrow keys ← and →.
- Enter/change values:

The parameters “Slot” and “XW Address” cannot be changed. They are fixed according to the word that is highlighted.
- Length in words: Highlight the letters in the “W/D” column. Each time you press ↵ the display will switch between “D” and “W”. Select “W” for a word or “D” for a double word. If you want to define a double word, the first word of the double word must be highlighted in the allocation table. When you select a double word, make sure that you configure both the current word and the word following it.

# FS Configurator

---

- Output point: Highlight the letters in the “S/C” column. Each time you press ↵ the display will switch between “C” and “S”. Select “S” to output data at each scan change or “C” to output data only after the operating system has been called.
- Overwrite value: PSS systems using selective shutdown must have overwrite values for the output segments. Highlight the entry under “Superscription val.” and enter the value.



## NOTICE

A correct overwrite value is essential for plant safety and must therefore be configured for each output segment.

### Delete entry:

Press “DEL” or F8.

### Poll information about a read/output segment:

Highlight the read/output segment in the upper dialogue box and press F2. A window will appear, showing information on the read/output segment.

## Alarm configuration

This dialogue box is used to define the allocation between the alarm input and the alarm organisation block.

### Procedure:

- Select “Alarm” from the “Configuration” menu.  
A dialogue box (Fig. 8-7) will appear.
- Under “Alarm code”, highlight the alarm OB which is to be used for the first input on the DIF module.

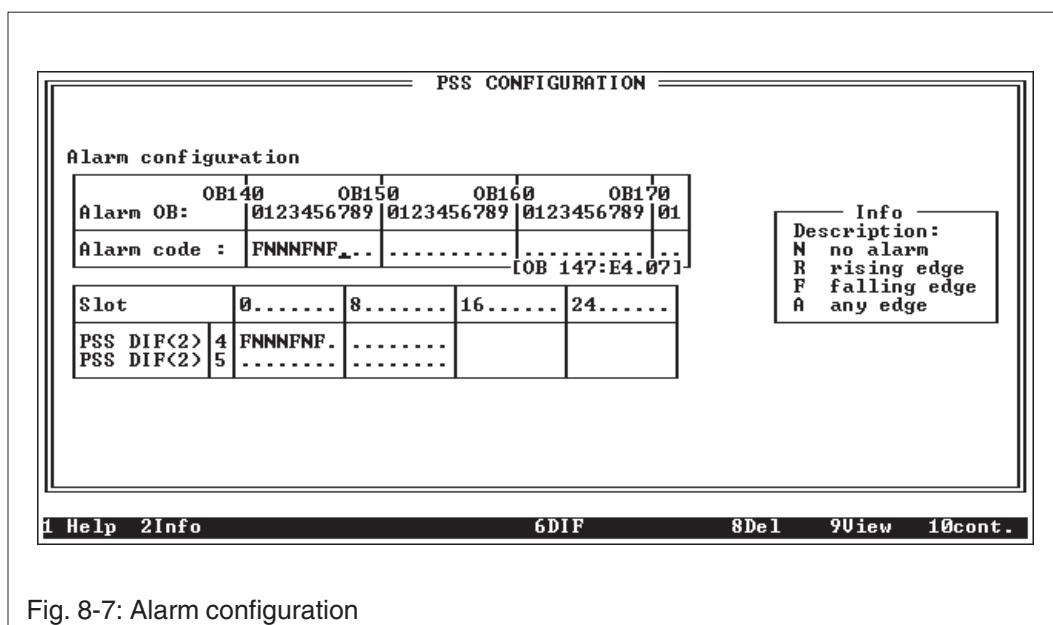
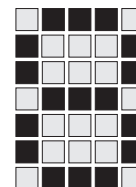


Fig. 8-7: Alarm configuration

- Press  $\downarrow$  to define the pulse edge that will trigger the selected alarm. Each time you press  $\downarrow$  the display will scroll between:  
K: No alarm  
S: Rising edge  
F: Falling edge  
J: Any edge
- Repeat the process until an alarm OB is assigned to all the inputs. It is not possible to miss out an alarm input when allocating the alarm OBs. Alarm OBs must be used in sequence.  
If the system contains several alarm modules, the alarm OBs must first be allocated to the inputs on the alarm module with the lowest slot number. Move to the next alarm module by pressing F6.

### Delete entry:

Highlight the entry and press “DEL” or F8.

### Poll information about a DIF input:

Highlight the DIF input in the upper dialogue box and press F2. A window will appear, showing information on the DIF input .

# FS Configurator

---

## Start-up password

If you would like to be able to start the FS section from the programming device (see Chapter 10, section entitled “Start/stop PSS”), you will need to establish a start password for the project.

### Procedure:

- Select the option “PSS start-up password” from the “Configuration” menu.
- Enter the required password and confirm by pressing ↵. There is no distinction between upper and lower case.

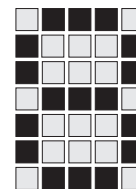
Make sure the start-up password is entered correctly, for there is no second prompt to check for potential typing errors.  
You can change the start-up password by setting a new password for the project, as described above.



### WARNING!

Only give the start-up password to those with thorough knowledge of the accident prevention measures to be taken on start-up.





---

## Configuring the PSS with selective shutdown

To configure a PSS with selective shutdown, simply follow the instructions given in the previous section for configuring a PSS without selective shutdown.

In addition to this you will need to store the selective shutdown data separately in a data block. The number of this data block is selected by the user.

Once you select a PSS with selective shutdown and activate selective shutdown functionality, you will be prompted to enter the number of this data block under “PSS type configuration” (Fig. 8-2).

If you switch off the selective shutdown function you can operate the PSS in the same way as a PSS without selective shutdown.

The standard menu items are as before:

- PSS type
- Hardware registry
- Basic data
- Test pulses
- XW addresses
- Alarms.

However, the following additional settings will be required on PSS systems with selective shutdown:

- Configure output pairs
- Configure signal groups.

### Configure output pairs

This dialogue box is used to define output pairs. If you do not require output pairs, continue the configuration by establishing signal groups.

#### **Procedure:**

- Select “Output pairs” from the “Configuration” menu.

A dialogue box will appear.

# FS Configurator

PSS CONFIGURATION				
Output peers				
Slot	0...4...	8...12..	16..20..	24..28..
PSS DI	0			
PSS DIO T	1			
PSS DIO Z	2		.....	.....
PSS AI	3			
PSS DIF(2)	4			
PSS DIF(2)	5			
PSS DO	6	.....	.....	.....
PSS DOR	7	.....		
PSS DI 2	8			
[A6.15]				
1 Help 2Info 8Del 9View 10cont.				

Fig. 8-8: Output pairs

- In the table, highlight the first output of the output pair and press ↵. The selected output will be marked with an “X”. Please note that only outputs marked with a bullet point can be allocated to an output pair.
- Highlight the second output of the output pair and press ↵. As soon as you select the second output, both outputs will be marked with an “X”. When the two outputs are no longer highlighted, the “X” will be replaced by a different letter.
- Repeat the process for each output pair.

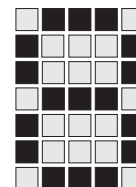
## Delete entry:

Highlight the output to be deleted and press “DEL” or F8. If the deleted output belonged to an output pair, you can assign a new partner to the remaining output.

## Poll information about an output

Highlight an output and press F2. A window will appear, showing the following information:

- Module on which the output is located
- Address of the output



- Signal group to which the output belongs
- Tolerance type of the signal group
- If relevant, the second output of the output pair.

## Configure signal groups

This dialogue box is used to determine the allocation of inputs/outputs to signal groups and to set the tolerance type of the signal groups. Signal groups must be configured on each PSS system with selective shutdown.

### Procedure:

- Select “Signal groups” from the “Configuration” menu.

A dialogue box will appear.

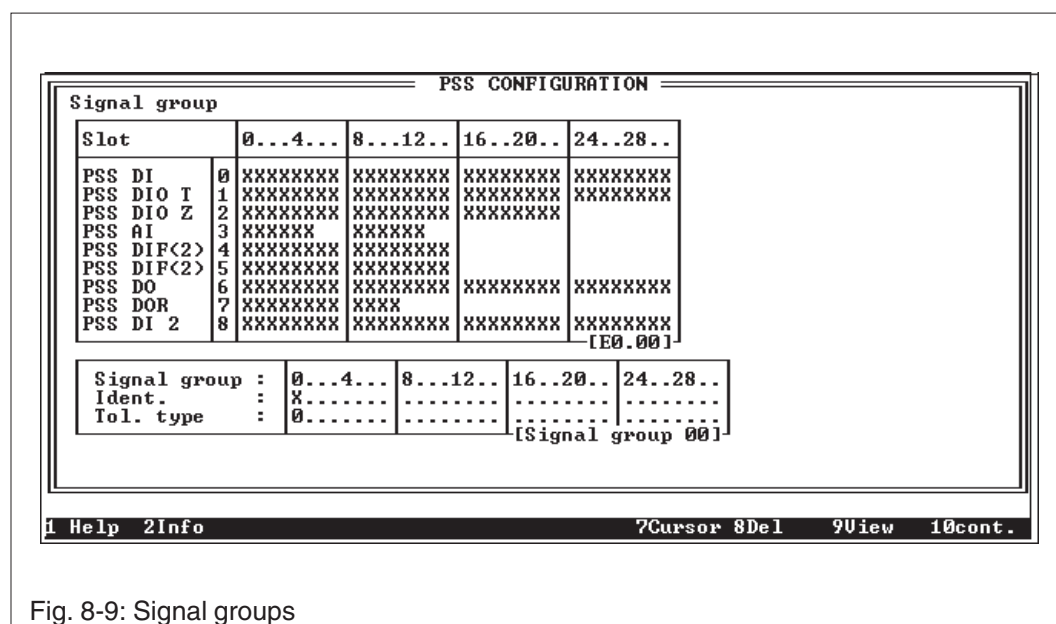


Fig. 8-9: Signal groups

The available modules will be shown in the upper table. Each input/output can be allocated to a signal group. It is possible to identify the signal group to which an input/output belongs by the designation. If it is marked “.”, the input/output does not belong to a signal group. If it is marked with an “X”, the signal group will be highlighted and can be edited.

# FS Configurator

---

- In the lower table, move the cursor in the “Ident.” line to below the signal group to be configured.
- Press ↵. A window will appear, showing a list of the different tolerance types. Use the arrow keys ↑ and ↓ to move up and down the list. Highlight the tolerance type and press ↵. The cursor will automatically move to the upper table.

## **OR**

If the tolerance type for the signal group has already been set and you do not wish to edit it, you can move straight to the upper table after you have highlighted the signal group by pressing TAB.

- In the upper table, use the arrow keys to move the cursor to an input/output which is to be assigned to the selected signal group. Press ↵. The input/output will be marked with an “X”. Repeat the process for all the inputs/outputs which are to be assigned to the signal group.
- Repeat the process for each signal group you wish to configure.

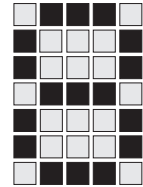
## **Change the signal group to which an input/output belongs:**

If you want to change the allocation of an input/output to a different signal group:

- In the lower table, highlight the signal group to which the input/output is to be assigned. The signal group designation will change to “X”.
- Move to the upper table, highlight the input/output and press ↵.

## **Change the tolerance type of a signal group:**

- In the lower table, highlight the signal group whose tolerance type is to be changed. The signal group designation will change to “X”.
- Press ↵. A window will appear, showing a list of the different tolerance types. Use the arrow keys ↑ and ↓ to move up and down the list. Highlight the tolerance type and press ↵.



---

### **Change format:**

If a signal group is highlighted, that signal group and its related inputs and outputs will be marked with an “X”. The other signal groups will likewise be labelled with identical figures or letters. To obtain an overview of the inputs and outputs, highlight the signal group and press F9. All the other signal groups will be shown with “\*”. Press F9 again to return to the previous format.

### **Poll information about a signal group:**

Highlight the signal group in the lower table and press F2. A window will appear, showing the tolerance type and deactivation OB of the signal group, together with all the inputs and outputs belonging to the group.

### **Poll information about an input/output:**

Highlight an input or output in the upper table and press F2. A window will appear, showing the following information:

- Module on which the input or output is located
- Address of the input or output
- The signal group to which the input or output belongs
- The tolerance type of the signal group
- If relevant, the test pulse output connected to the input.

### **Delete entry:**

Highlight the entry and press “DEL” or F8.

# FS Configurator

---

## Configuring the PSS with SafetyBUS p

If your PSS has a SafetyBUS p connection you will need to configure the device for SafetyBUS p in addition to the standard configuration settings described under “PSS configuration” (page 8-1).

SafetyBUS p configuration settings will establish the bus structure and subscribers as well as the settings for the individual subscribers.

The two configurations can be made in any sequence. If you wish to configure the SafetyBUS p first, go to “PSS type” in the Configuration menu, select a PSS with SafetyBUS p connection and activate “SafetyBUS” functionality (please refer also to the section entitled “Set PSS type for SafetyBUS p”). Only then will the menu items for SafetyBUS p configuration be available.



### INFORMATION

Press F10 to exit the configuration window and accept the configuration settings.

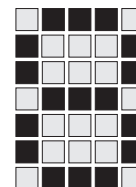
Press “ESC” to exit the configuration window and reject the configuration settings.



### INFORMATION

If the letters “L” (left), “R” (right), “U” (up) or “D” (down) are displayed in the window's border, you can use the arrow keys to scroll in the relevant direction.

The following section explains how SafetyBUS p is configured. Please refer to the SafetyBUS p System Description for details of how to create an entire project for SafetyBUS p. The System Description also contains a glossary of specific SafetyBUS p terminology.



## Set PSS type for SafetyBUS p

To configure SafetyBUS p you will need to carry out the following steps:

- Select “PSS type” from the configuration menu.  
A dialogue box will appear. If you are creating a new project, this box will appear automatically when you call up the configurator.

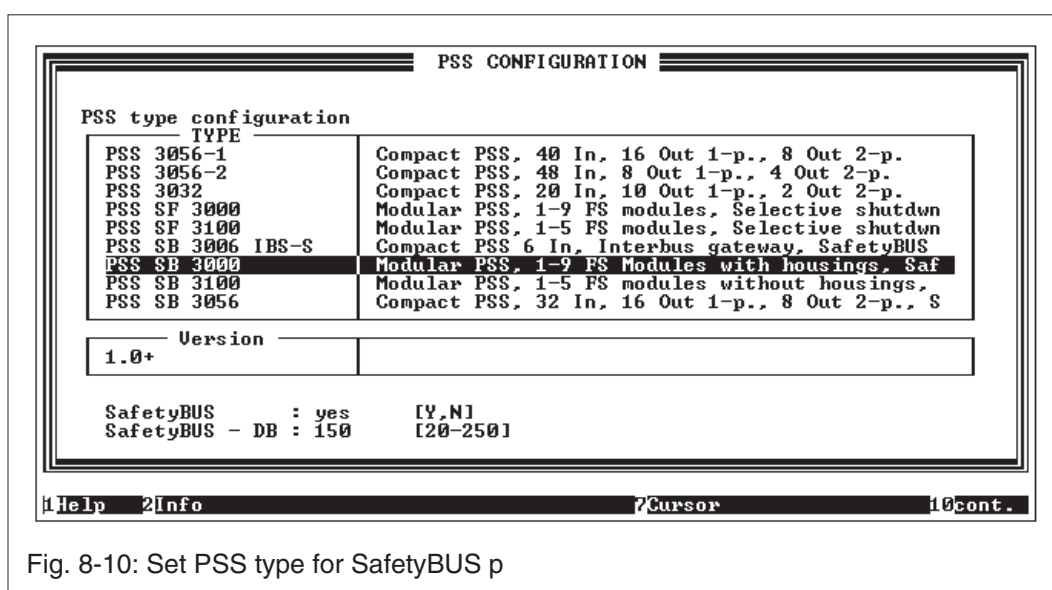


Fig. 8-10: Set PSS type for SafetyBUS p

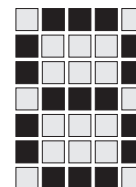
- In the table of PSS types, highlight the line containing the SafetyBUS p compatible PSS you are using and press  $\downarrow$ . If you are configuring a SafetyBUS p network with several PSS systems, at this point you can define whether a PSS is the Management Device or one of the PSS systems on the bus.
- Select the version of your PSS from the list and confirm by pressing  $\downarrow$ . The version number of your PSS can be found on the type label or, if the system is connected, under “PSS configuration” in the “Online” menu.
- To activate the SafetyBUS p functionality of your PSS, enter “y” in the “SafetyBUS:” line. Enter “n” if you do not wish to use the SafetyBUS p functionality of your PSS. In this case it will no longer be possible to carry out the SafetyBUS p configuration.

# FS Configurator

---

- In the line “SafetyBUS - DB:” enter the data block you wish to use as configuration data block for your SafetyBUS p network. Please note:
  - Available data blocks are DB 020 to DB 250.
  - The selected data block will be used as the configuration block in each PSS connected to SafetyBUS p. The data block following the stated DB will be used as the PIO-output overrun DB.
  - Several configuration data blocks may be required if the bus configuration is extensive. In the case the configurator will automatically occupy the data block(s) following the stated data block.  
Once the configuration is complete you can view a list of the generated DBs by calling up “Directory” from the “FS Project” menu. From this list you will be able to see the number of DBs occupied by the SafetyBUS p configuration.
  - Data blocks that are used as the PIO-output overrun DB and SafetyBUS p configuration data block(s) are automatically disabled for use within the user program.
- Exit the dialogue box by pressing F10. If necessary, the hardware registry window will be called up. You can enter the registered hardware at this point (see page 8-3) or you can choose to enter the data later (press “ESC”). The information is not required for the SafetyBUS p configuration.





## Designing the bus structure

Select the “SafetyBUS” option from the configuration menu. If you have created a new project, the menu shown in Fig. 8-11 will appear automatically when you call up the SafetyBUS p configurator. The entire SafetyBUS p configuration is controlled via this menu. It can be called up during configuration by pressing F7.

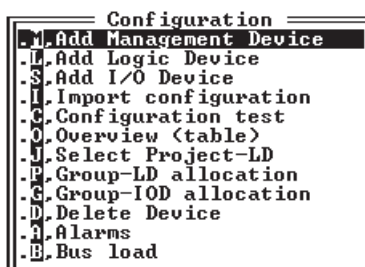


Fig. 8-11: F7 menu

The “bus overview window” will appear as soon as you add the first device in the bus structure. The overview window displays the bus structure.

## Adding a Management Device

Only one Management Device is permitted on SafetyBUS p.

- Press F7. A window appears, showing several menu items.
- Select “Add Management Device”. A window will appear, in which you can set the device address of the new Management Device.

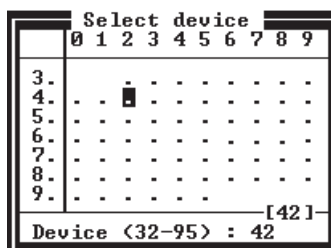


Fig. 8-12: Setting the device address

# FS Configurator

- Use the arrow keys to move the cursor to the required device address. The selected address will also be displayed numerically below the input field.  
Device addresses that have already been assigned will be indicated by a letter or character. These mean the following:
  - “\*”: address already assigned
  - “L”: address assigned to a Logic Device (without virtual I/O-Devices)
  - “?”: address assigned to an I/O-Device that has not yet been assigned to a group.
- Press F10 to close the window.

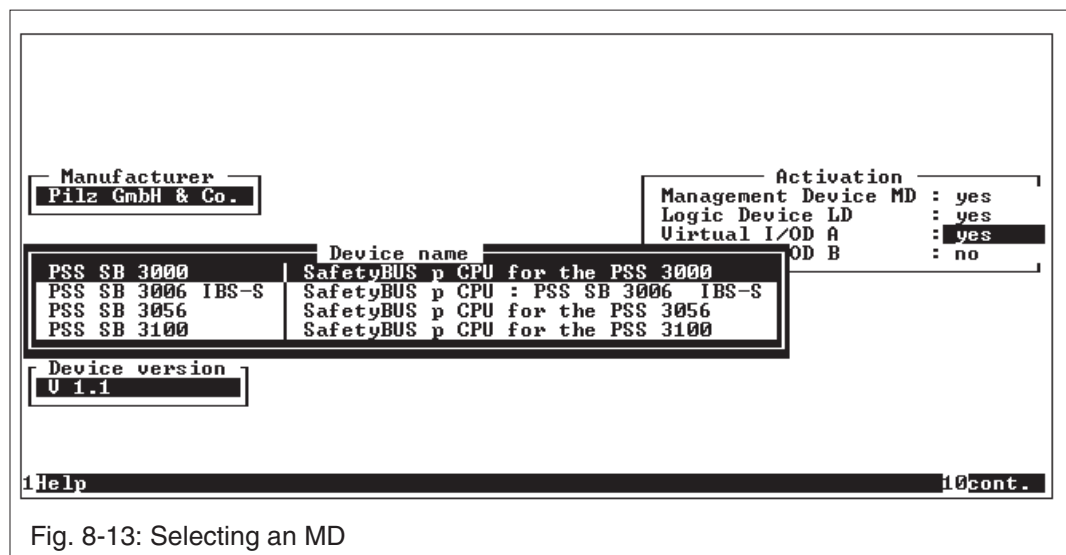
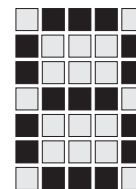


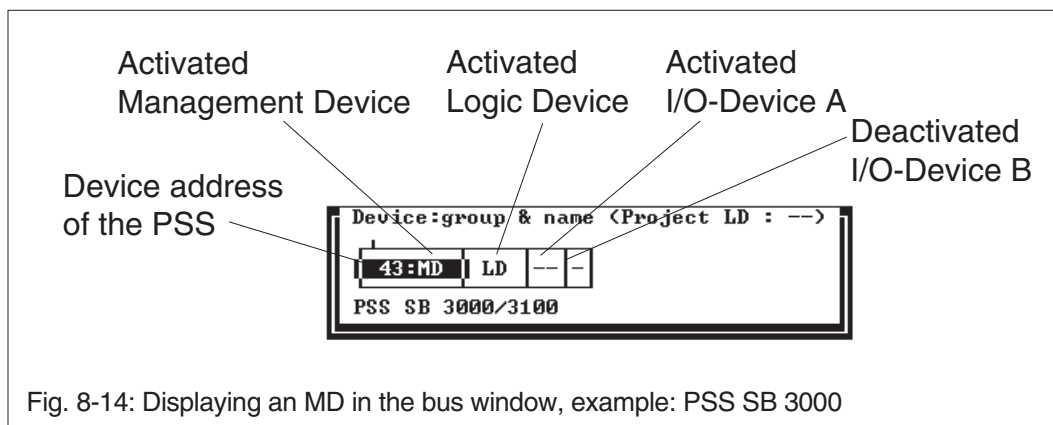
Fig. 8-13: Selecting an MD

- Several windows will now open:
  - “Manufacturer” window: to select the manufacturer of the Management Device.
  - “Device name” window: to select the device
  - “Device version” window: to select the device version
  - “Activation” window: in this window you can activate and deactivate individual elements on the device (by entering “y” or “n”). “MD” will automatically be activated as you are currently configuring the Management Device. “LD” will also need to be activated, otherwise the PSS and SafetyBUS p will not be able to communicate.  
Your application will determine whether or not the virtual I/O-Devices need to be activated (see SafetyBUS p System Description).



Use the TAB key to move between the individual windows. When you have made all the settings, press F10.

- The device will now be displayed in the bus window.



### INFORMATION

The device address of the Logic Device for which the project is being created can be entered in the bus overview window ("Proj. LD: --"). This information is important if you are configuring SafetyBUS p with a number of different Logic Devices (see section entitled "Transfer SafetyBUS p configuration to all LDs on the bus"). The device address you enter is not significant for the SafetyBUS p configuration.

- Further entries can also be called up for the Management Device; some of these entries can also be amended.  
Use the arrow keys to move the cursor to the Management Device and press ↵. The "Management Device" window will appear.

# FS Configurator

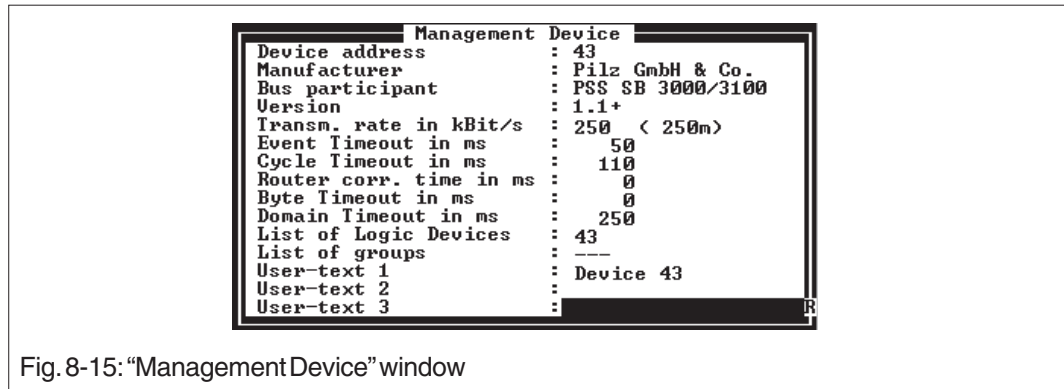
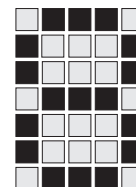


Fig. 8-15: "Management Device" window

The list below explains the entries that can be viewed in this window. To edit an entry, move the cursor to the relevant line, enter the value and press ↵.

- Device address (cannot be amended)  
Device address of the Management Device
- Manufacturer (cannot be amended)  
Manufacturer of the device
- Bus participant (cannot be amended)  
Device description of the Management Device
- Version (cannot be amended)  
Device version
- Transmission rate (can be amended)  
Bus transmission rate
- Event timeout (can be amended)  
The event timeout is used to monitor whether bit data is acknowledged by the recipient bus subscriber within the prescribed time period, and therefore monitors the maximum transmission time (see SafetyBUS p System Description). The bus load analysis can be used to determine a value for the event timeout (see overleaf).
- Cycle timeout (can be amended)  
Bus subscribers use the cycle timeout as a timeout for the connection test. It corresponds to the maximum error reaction time (see SafetyBUS p System Description).  
The bus load analysis can be used to determine a value for the cycle timeout (see overleaf).



- Router correction time (can be amended)  
If the bus system is using a router you will need to enter a router correction time (see operating manual for the relevant router).
- Byte timeout (can be amended)  
Has no functionality at present.
- Domain timeout (can be amended)  
The domain timeout is used to monitor the transfer of domain telegrams (see SafetyBUS p System Description).
- List of Logic Devices (cannot be amended)  
List of all the Logic Devices configured on the bus.
- List of groups (cannot be amended)  
List of all the I/O-Groups configured on the bus.
- User text (can be amended)  
Comment on the device.
- Exit the window by pressing F10 if you have made changes, otherwise press “ESC”.

## Bus load analysis

Bus load analysis can be used as a guide for determining the event timeout and cycle timeout.

- Press F7 in the bus window. A window appears, showing several menu items.
- Select “Bus load”. A window will appear, in which you can carry out the bus load analysis.

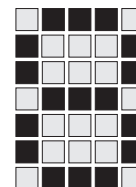
Bus load analysis <theor.>		
Calculation basics	:	< default >
Transm. rate in kBit/s	:	250 < 250 m>
Router corr. time in ms	:	0
Entered theor. calculated		
No. of events	:	20
Event timeout in ms	:	< 50> 29
Cycle timeout in ms	:	<110> 35
For a low event number the theor. calculated values can deviate.		

Fig. 8-16: Bus load analysis

# FS Configurator

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- The list below explains the entries that can be viewed in this window. To edit an entry, move the cursor to the relevant line, enter the value and press  $\downarrow$ . If you do not want to make any changes, press “ESC” and the old value will reappear.
  - Calculation basics  
A fixed bus load is taken as the calculation basis. The default value is 90 %. You should keep this value for the time being. If the bus is in operation, you can select “SafetyBUS p” from the “On-line” menu, then press F9 and select “Read bus diagnostics”. From there you can read the value for the “Current bus load as %”. You can then use this value to repeat the bus load analysis.
  - Transmission rate  
The transmission rate must be entered in relation to the cable runs on the bus. If you go to the “Transmission rate” line and press  $\downarrow$ , you will be able to select the value from a table.
  - Router correction time  
If the bus system uses a router, a router correction time will need to be stated (see operating manual for the relevant router).
  - No. of events  
Here you will need to enter the maximum number of potential I/O-changes (events) within a cycle.  
I/O-changes are signal changes at the input of an I/O-Device, as well as outputs on an I/O-Device that are changed by the application program. Outputs that are in the same output word and are changed by the application program simultaneously (within one PSS cycle) must only be considered as one I/O-change.  
Example: A 34.0 and A 34.15 are changed = 1 I/O-change  
A 34.0 and A 34.16 are changed = 2 I/O-changes  
The SafetyBUS p System Description (from Version 3) describes in detail how the number of events is determined.
- As soon as one of the values has been changed, the event timeout and cycle timeout are recalculated and displayed in the column “Theor. calculated”. If you would like to accept the event timeout and cycle timeout for your bus system, you can enter the values in the “Entered” column.



## Adding a Logic Device

SafetyBUS p may contain several Logic Devices.

- Press F7. A window appears, showing several menu items
- Select “Add Logic Device”. A window will appear, in which you can set the device address of the new Logic Device
- Use the arrow keys to move the cursor to the required device address. The selected address will be displayed numerically below the input field. Device addresses that have already been assigned will be indicated by a letter or character. These mean the following:
  - “\*”: address already assigned
  - “L”: address assigned to a Logic Device (without virtual I/O-Devices)
  - “?”: address assigned to a device that has not yet been assigned to a group.
- Press F10 to close the window.

Device:group & name <Project LD : -->

43:MD LD -- -

PSS SB 3000/3100

Manufacturer: Pilz GmbH & Co.

Activation:

Device name	Address
PSS SB 3000/3100	SafetyBUS p CPU auf der Basis PSS 3000/3100
PSS SB 3056	SafetyBUS p CPU auf der Basis PSS 3056
PSS SB 3006 IBS-S	SafetyBUS p CPU, Systemkoppler, Interbus
PSS SB 3006 DP-S	SafetyBUS p CPU, Systemkoppler, Profibus

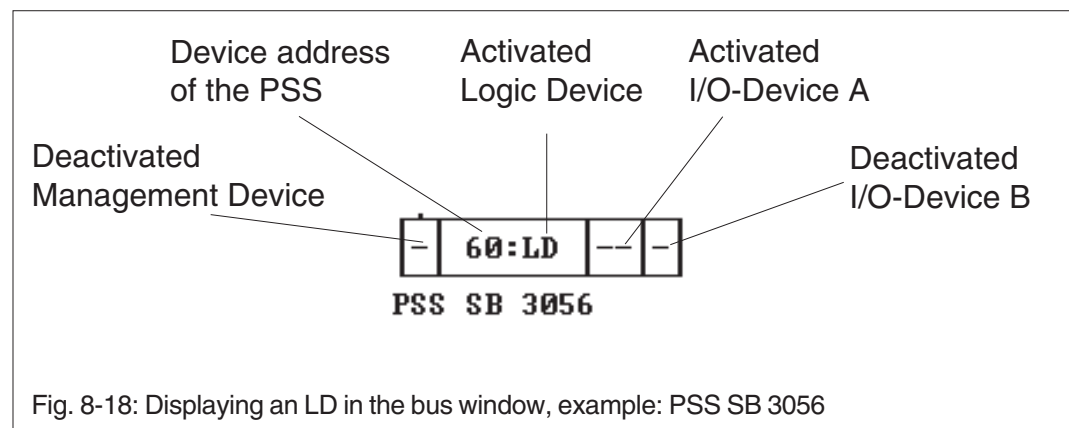
Device version: ab U 1.1

1,help 10cont.

Fig. 8-17: Selecting an LD

# FS Configurator

- Several windows will now open (Fig. 8-17):
    - “Manufacturer” window: to select the manufacturer of the Management Device.
    - “Device name” window: to select the device
    - “Device version” window: to select the device version
    - “Activation” window: in this window you can activate and deactivate individual elements on the device (by entering “y” or “n”). “MD” will automatically be deactivated as there can only be one Management Device on the bus. “LD” will automatically be activated, otherwise the PSS and SafetyBUS p will not be able to communicate. Your application will determine whether or not the virtual I/O-Devices need to be activated (see SafetyBUS p System Description).
- Use the TAB key to move between the individual windows. When you have made all the settings, press F10.
- The device will now be displayed in the bus window.

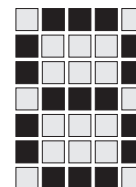


## INFORMATION

The device address of the Logic Device for which the project is being created can be entered in the bus overview window (“Proj. LD: --”). This information is important if you are configuring SafetyBUS p with a number of different Logic Devices (see section entitled “Transfer SafetyBUS p configuration to all LDs on the bus”). The device address you enter is not significant for the SafetyBUS p configuration.

- Further entries can also be called up for the Logic Device.  
Use the arrow keys to move the cursor to the Logic Device and press ↵. The “Logic Device” window will appear.





```
Logic Device
Device address : 60
Manufacturer   : Pilz GmbH & Co.
Bus participant : PSS SB 3056
Version        : 1.1+
List of groups : ---
User-text 1    : Device 60
User-text 2    :
User-text 3    :
```

Fig. 8-19: "Logic Device" window

The list below explains the entries that can be viewed in this window.  
None of these entries can be amended.

- Device address (cannot be amended)  
The list below explains the entries that can be viewed in this window.  
Only the user text can be amended.

- Device address (cannot be amended)  
Device address of the Logic Device

- Manufacturer (cannot be amended)  
Manufacturer of the Logic Device

- Bus participant (cannot be amended)  
Device description of the Logic Device

- Version (cannot be amended)  
Device version

- List of groups (cannot be amended)  
List of all the I/O-Groups assigned to the Logic Device.  
If the Logic Device has read and write access to an I/O-Group, the group number of this I/O-Group will be followed by the letter "M" (for Master-LD)

- User text (can be amended)  
Comment on the Device

- Exit the window by pressing F10.

# FS Configurator

## Adding an I/O Device

Press F7. A window appears, showing several menu items.

- Select “Add I/O Device”. A window will appear, in which you can set the device address of the new I/O device.
- Use the arrow keys to move the cursor to the required device address. The selected address will also be displayed numerically below the input field.

Device addresses that have already been assigned will be indicated by a letter or character. These mean the following:

- “\*”: address already assigned
  - “L”: address assigned to a Logic Device (without virtual I/O-Devices)
  - “?”: address assigned to a device that has not yet been assigned to a group.
- Press F10 to close the window.

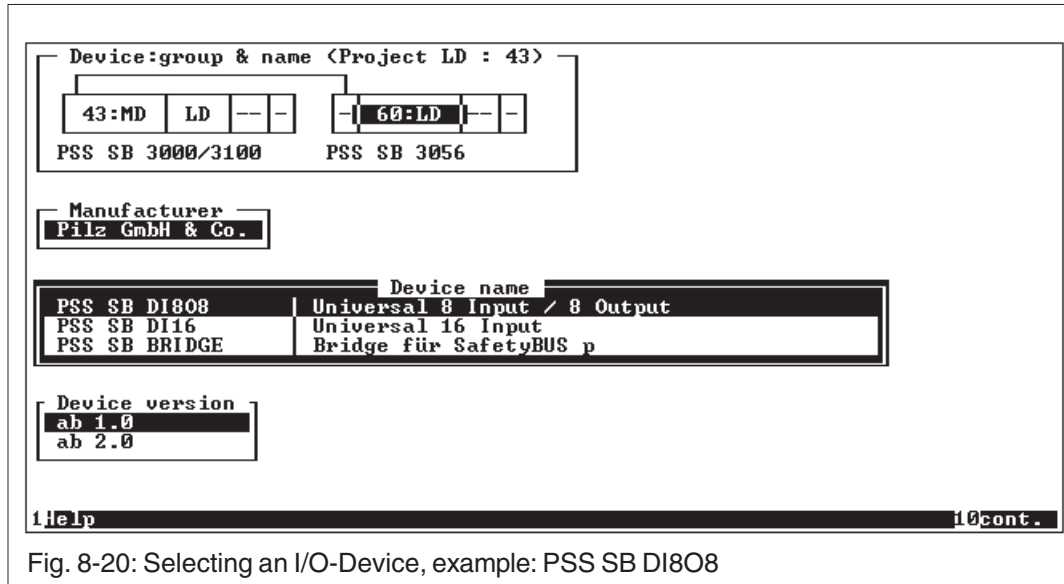
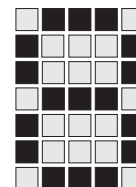


Fig. 8-20: Selecting an I/O-Device, example: PSS SB DI808

- Several windows will now open:
  - “Manufacturer” window: to select the manufacturer of the I/O-Device
  - “Device name” window: to select the device
  - “Device version” window: to select the device version
  - “Activation” window (not on all I/O devices): in this window you can determine which parts of the device are to be activated.



Use the TAB key to move between the individual windows. When you have made all the settings, press F10.

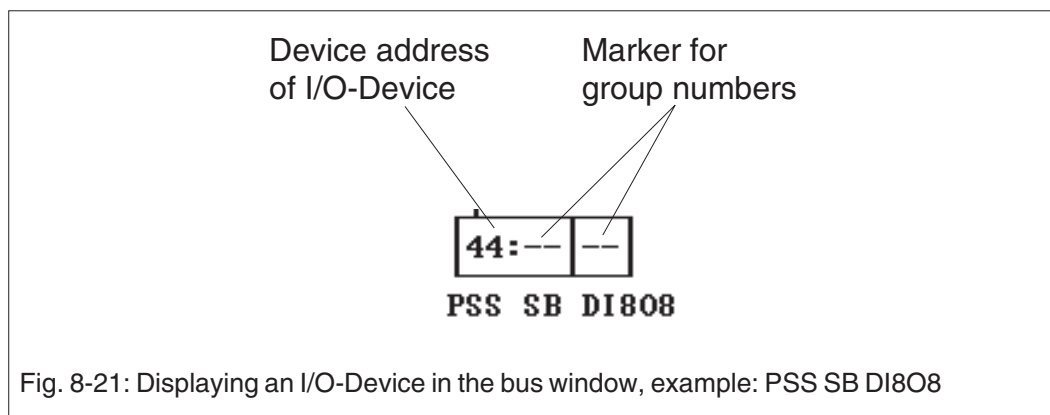
Additional prompts may follow, depending on the device you have selected.



### INFORMATION

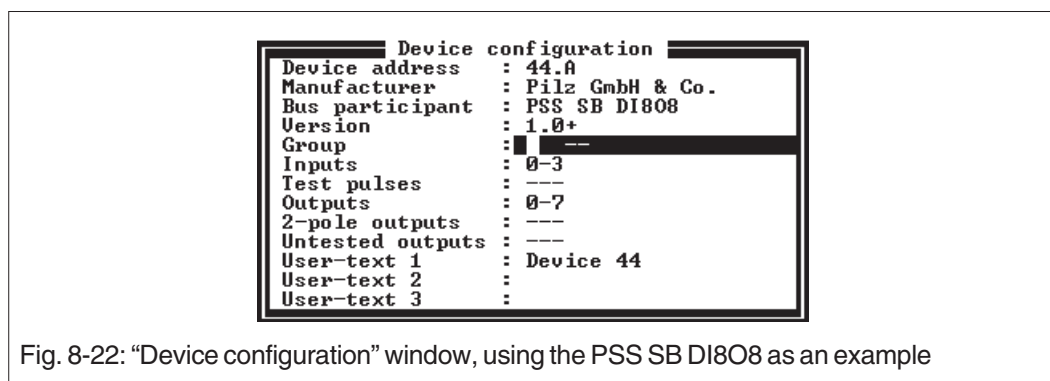
Device-specific prompts/setting options (e.g. configuration options on the PSS SB DI808 module) are described in the manual for the respective device.

- The I/O device will now be displayed in the bus window.



- Further entries can also be called up for the I/O-Device; some of these entries can also be amended.

Use the arrow keys to move the cursor to the I/O-Device and press ↵. The “Device configuration” window will appear.



# FS Configurator

---

The entries made in this window will depend on the selected I/O device. However, the lines below are the same on all I/O-Devices:

- Device Address (cannot be amended)  
Device address of the I/O-Device
- Manufacturer (cannot be amended)  
Manufacturer of the I/O-Device
- Bus participant (cannot be amended)  
Device description of the I/O-Device
- Version (cannot be amended)  
Device version
- I/O-Group (can be amended)  
I/O-Group to which the I/O-Device belongs
- User text (can be amended)  
Comment on the Device

Use the arrow keys to move between the lines in which entries can be made.

In some lines you can enter numeric values (confirm by pressing ↵); in other lines, pressing ↵ will take you to the window in which you can enter the relevant configuration.

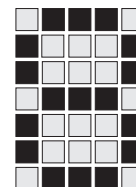


## INFORMATION

Device-specific configurations are described in the manual for the respective device.

### Deleting a device from the bus structure

- In the bus window, highlight the device you wish to delete. Use the arrow keys to select the individual devices.
- Press F7. A window appears, showing several menu items.
- Select “Delete Device”.



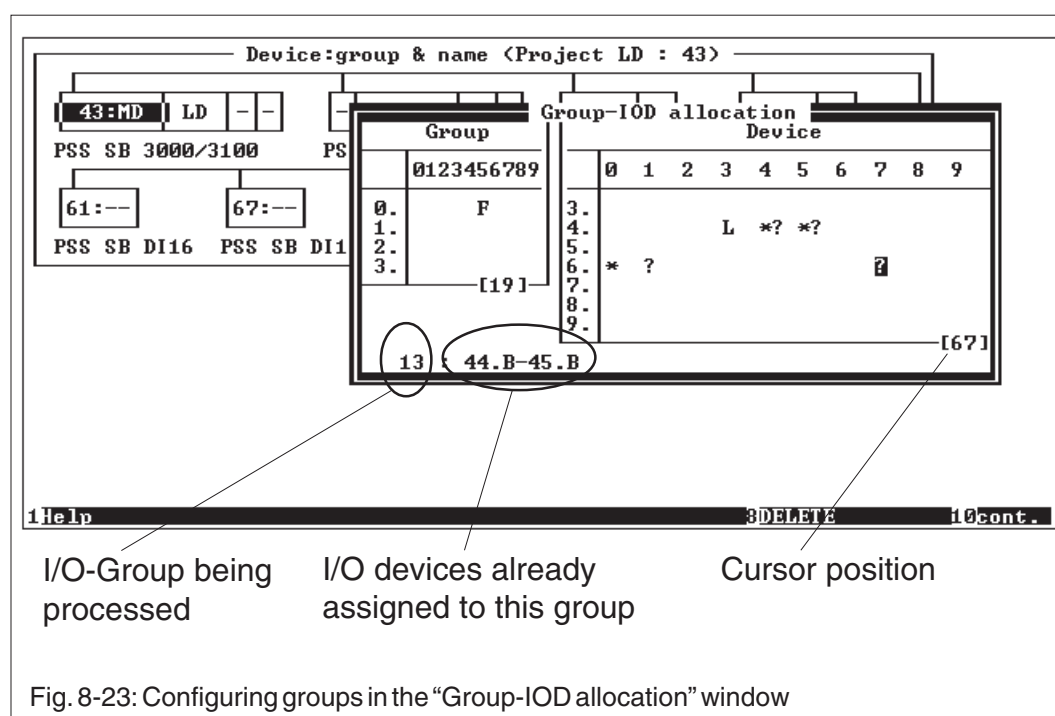
## Configuring I/O groups

Adding an I/O-Device to an I/O group/changing the group it belongs to

All I/O devices on SafetyBUS p must be allocated to a specific group.  
This can be done in two ways.

### 1st option:

- Activate the bus window and press F7. A window appears, showing several menu items.
- Select “Group-IOD allocation”.



- On the left-hand side of the window, use the arrow keys to move the cursor to the I/O-Group you wish to configure or to which you wish to assign a new device. Press ↵.
- Use the arrow keys to move the cursor to the right-hand side of the window. Position the cursor on the I/O-Device to be assigned to the I/O-Group and press ↵. The selected I/O-Device will be added to the information bar at the bottom of the window.

# FS Configurator

Key to characters in the left half of the window:

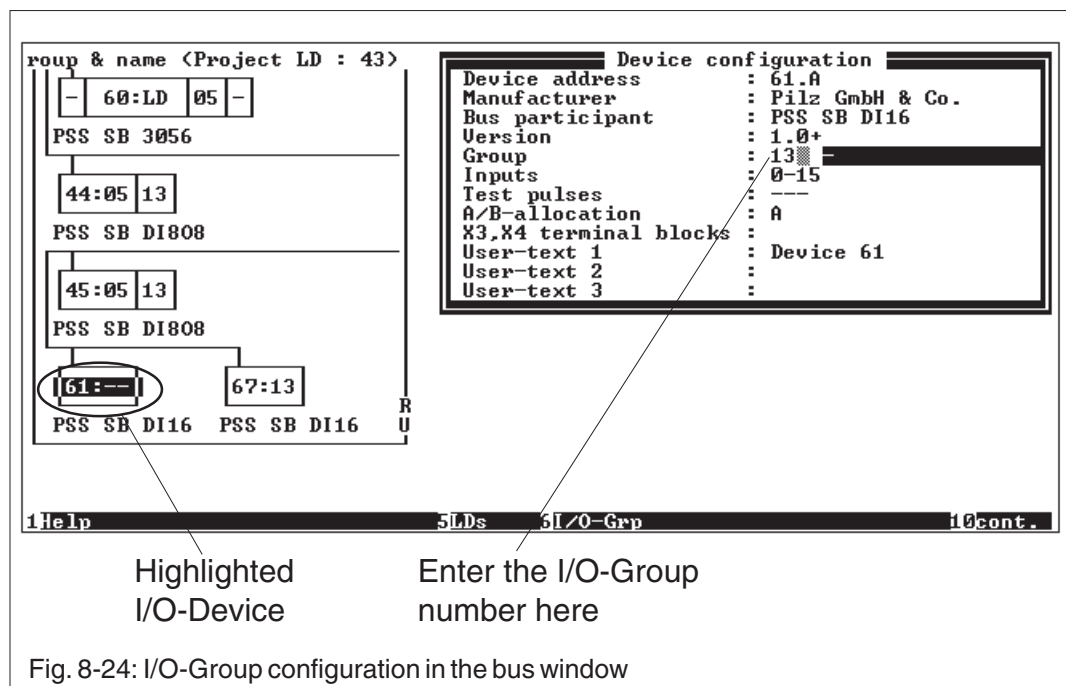
- "F": signifies an I/O-Group that has not yet been assigned an LD
- "\*": signifies an I/O-Group that has already been assigned an LD

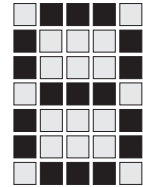
Key to characters in the right half of the window:

- "?": signifies the available I/O-Devices
  - "\*": signifies I/O-Devices that have already been allocated to an I/O-Group
  - "L": this device (MD) does not need to be assigned to an I/O-Group.
- When you have assigned all the I/O-Devices to the group you can configure additional groups or exit the window by pressing F10.

## 2nd option:

- Activate the bus window and use the arrow keys to move the cursor to the I/O-Device that is going to be assigned to a group. Press ↵.
- The "Device configuration" window appears. Move the cursor to "Group" and enter the I/O-Group number. Press ↵.
- Exit the window by pressing F10.





---

## Deleting an I/O-Device from an I/O-Group

To delete an I/O-Device from an I/O-Group, you will need to be in the “Group-IOD allocation” window.

- Activate the bus window and press F7.
- Select “Group-IOD allocation”.
- In the left half of the window, use the arrow keys to move the cursor to the group from which you wish to delete the I/O-Device. Press ↵. The selected I/O-Group will be displayed in the information bar.
- In the right half of the window, move the cursor to the device address of the I/O-Device and press “DEL”. This will remove the I/O-Device from the I/O-Group and it will no longer be shown in the information bar.
- Exit the window by pressing F10.

It is also possible to delete several I/O-Devices at once.

## Deleting an I/O-Group

To delete an I/O-Group you will need to be in the “Group-IOD allocation” window.

- Activate the bus window and press F7.
- Select “Group-IOD allocation”.
- In the left half of the window, use the arrow keys to move the cursor to the I/O group you wish to delete. Press “DEL”.
- Respond to the security check and then exit the window by pressing F10 or configure additional I/O-Groups, as required.

# FS Configurator

## Setting Logic Devices for the I/O-Groups

### Allocating a Logic Device to an I/O-Group

All I/O-Groups on SafetyBUS p must have permissions set, to establish which Logic Devices can access them.

Each I/O-Group may be assigned one or more LDs. However, only one of these LDs may have read and write access. The remaining LDs will only be permitted read access to the I/O-Group.

- Activate the bus window and press F7. A window appears, showing several menu items.
- Select “Group-LD allocation”.

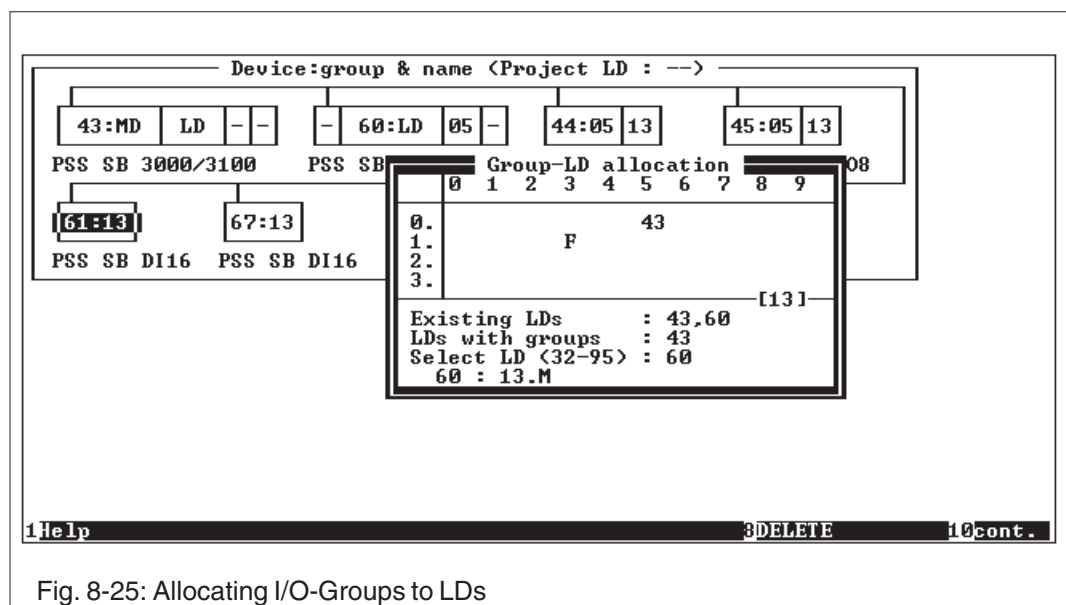
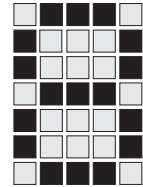


Fig. 8-25: Allocating I/O-Groups to LDs

- Enter the address of the Logic Device you wish to configure or to which you wish to assign an additional I/O-Group. When you enter a figure the cursor will automatically jump to the line “Select LD”. Press ↵. The cursor will jump to the top half of the window and the selected LD will be displayed in the information bar.
- In the information bar, use the arrow keys to move the cursor to the number of the I/O-Group that you wish to assign to the LD. At this point you will have to decide whether the LD is to have read-only access to the I/O-Group or read and write access:





- Read-only: press ↵
- Read/write: enter "m" (for Master-LD)

The selected I/O-Group will be added to the information bar in the bottom half of the window. If you have granted the Logic Device read/write access to this I/O-Group, the group number will be followed by the letter "M" (for Master-LD).

- When you have assigned all the required I/O-Groups to the LD, you can configure additional LDs or exit the window by pressing F10.

### Deleting the allocation of an I/O-Group to a Logic Device

To do this you will need to be in the "Group-LD allocation" window.

- Activate the bus window and press F7.
- Select "Group-LD allocation".
- Under "Select LD", enter the address of the Logic Device from which you wish to delete the I/O-Group. Press ↵. The selected LD will be displayed in the information bar.
- In the top half of the window, use the arrow keys to move the cursor to the I/O-Group which is no longer to be assigned to the LD. Press "DEL". This will remove the allocation of the I/O-Group to the LD and the I/O group will no longer be shown in the information bar.
- Exit the window by pressing F10.

It is also possible to delete several I/O-Groups from the assignment at once.

### Deleting the allocation of all I/O-Groups to a Logic Device

To do this you will need to be in the "Group-LD allocation" window.

- Activate the bus window and press F7.
- Select "Group-LD allocation".
- Under "Select LD", enter the address of the Logic Device from which you wish to delete the I/O-Group. Press "DEL".

# FS Configurator

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## Changing the access rights of a Logic Device

To change the access rights of an LD to an I/O-Group from read/write to read-only, or vice versa, you will need to be in the “Group-LD allocation” window.

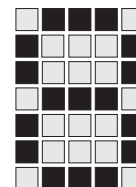
- Activate the bus window and press F7.
- Select “Group-LD allocation”.
- Enter the address of the Logic Device whose access rights you wish to change. When you enter a figure the cursor will automatically jump to the line “Select LD”. Press ↵. The selected LD will be displayed in the information bar.
- In the top half of the window, use the arrow keys to move the cursor to the I/O-Group for whose LD the access rights are to be changed. Press “DEL” and enter the required access rights:

- Read-only: press ↵

- Read/write: enter “m” (for Master-LD)

The number of the I/O-Group will be added to the information bar in the bottom half of the window. If you have granted the Logic Device read/write access to this I/O-Group, the group number will be followed by the letter “M” (for Master-LD).

- Exit the window by pressing F10.



## Configuring process interrupts on I/O-Devices

Process interrupts enable you to react quicker to events. When an alarm event occurs at an alarm input, program processing (user program in the LD) is interrupted and an alarm reaction is carried out.

Please ensure you read the section on “Alarms” in the “SafetyBUS p System Description”.



### INFORMATION

You can only use alarms on SafetyBUS p if this is supported by the PSS operating system. On the PSS types listed below, alarm processing is only supported from the version number stated:

- PSS SB CPU from version 1.5
- PSS1 SB CPU from version 1.5
- PSS SB 3056 from version 1.3
- PSS SB 3006 IBS-S from version 1.3



### INFORMATION

Alarm inputs must be configured separately for each LD; the configuration is only ever valid for that single LD.

Device:group & name <Project LD : 43>

43:MD	MD	-	-	60:LD	05	-	44:05	13	45:05	13
-------	----	---	---	-------	----	---	-------	----	-------	----

Alarm configuration

OB	:	1	2	3	4	5	6	7
	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
	:	9	0	1	2	3	4	5
	:	6	7	8	9	0	1	2
	:	3	4	5	6	7	8	9
	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
	:	9	0	1	2	3	4	5
	:	6	7	8	9	0	1	2
	:	3	4	5	6	7	8	9
	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
	:	9	0	1	2	3	4	5
	:	6	7	8	9	0	1	2
	:	3	4	5	6	7	8	9
	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
	:	9	0	1	2	3	4	5
	:	6	7	8	9	0	1	2
	:	3	4	5	6	7	8	9
	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
	:	9	0	1	2	3	4	5
	:	6	7	8	9	0	1	2
	:	3	4	5	6	7	8	9
	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
	:	9	0	1	2	3	4	5
	:	6	7	8	9	0	1	2
	:	3	4	5	6	7	8	9
	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
	:	9	0	1	2	3	4	5
	:	6	7	8	9	0	1	2
	:	3	4	5	6	7	8	9
	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
	:	9	0	1	2	3	4	5
	:	6	7	8	9	0	1	2
	:	3	4	5	6	7	8	9
	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
	:	9	0	1	2	3	4	5
	:	6	7	8	9	0	1	2
	:	3	4	5	6	7	8	9
	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
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	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
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	:	6	7	8	9	0	1	2
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	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
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	:	4	5	6	7	8	9	0
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	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
	:	9	0	1	2	3	4	5
	:	6	7	8	9	0	1	2
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	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
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	:	8	9	0	1	2	3	4
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	:	4	5	6	7	8	9	0
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	:	4	5	6	7	8	9	0
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	:	5	6	7	8	9	0	1
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	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
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	:	8	9	0	1	2	3	4
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	:	2	3	4	5	6	7	8
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	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8	9	0	1	2	3	4
	:	5	6	7	8	9	0	1
	:	2	3	4	5	6	7	8
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	:	6	7	8	9	0	1	2
	:	3	4	5	6	7	8	9
	:	0	1	2	3	4	5	6
	:	7	8	9	0	1	2	3
	:	4	5	6	7	8	9	0
	:	1	2	3	4	5	6	7
	:	8						

# FS Configurator

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To configure alarm inputs for an LD, follow the instructions below (the alarm configuration is valid for the LD whose project is just being created, i.e. is stated in the bus window):

- Activate the bus window and press F7.
- Select “Alarm”.
- In the line marked “Code”, move the cursor to the alarm organisation block which is to be assigned to the alarm.
- Define the pulse edge that will trigger the alarm at the alarm input:  
F = Falling edge  
R = Rising edge  
A = Any edge



## NOTICE

Alarm inputs for safety functions must operate according to the failsafe principle (on switching off). This means that only alarms configured with a falling edge are safety-related.

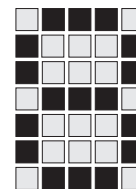
- Use the arrow keys to move the cursor to the “Device address” line and enter the address of the device containing the alarm input.
- Use the arrow keys to move the cursor to the “Alarm input” line and enter the number of the alarm input.

It is also possible to configure a common alarm for all inputs from Section A or Section B of a decentralised I/OD or from virtual I/OD A or I/OD B; this is known as a word alarm.

Example:

The decentralised module PSS SB DI8O8 with device address 32 is divided into Section A and B. Inputs E 32.00, E 32.01 and E 32.02 belong to Section A. The LD with address 56 has read-only access to the inputs from Section A.

When the project is created for the LD in the programming device configurator, an alarm is set for Section A. This alarm is triggered by a rising edge and calls up alarm organisation block OB 045 as an alarm reaction. This means that, if the signal changes from 0 to 1 on any of the inputs E 32.00, E 32.01 or E 32.02, this alarm will always be triggered. An additional bit alarm could also be configured, for example, for input E 32.00. This could be triggered by a falling edge and could call up alarm organisation block OB 043 as the alarm reaction.



### INFORMATION

A maximum of 64 alarms may be configured for a SafetyBUS p system.

- Exit the window by pressing F10.

## Bus window display formats

The bus structure can be displayed in the bus window in a number of different formats. The display formats can only be called up from the activated bus window. To do this press F9.

“Display dev : grp & name”

The module descriptions are shown in the bus structure.

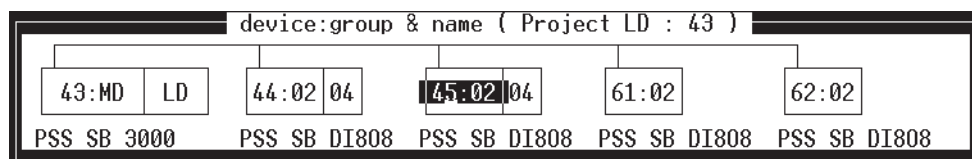


Fig. 8-27: Bus structure format: “Display dev : grp & name”

“Display device”

The module descriptions and the numbers of the I/O-Groups are not displayed.

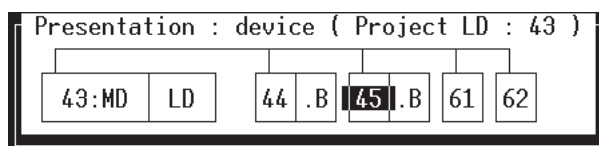


Fig. 8-28: Bus structure format: “Display device”

# FS Configurator

## “Display device: group”

The device addresses and I/O-Group numbers of the I/O-Devices can be seen in the bus structure.

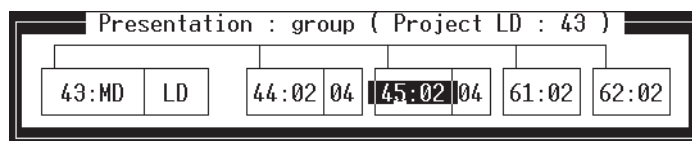


Fig. 8-29: Bus structure format: “Display dev : group”

## “Display groups”

The I/O-Group numbers of the I/O-Devices can be seen in the bus structure.

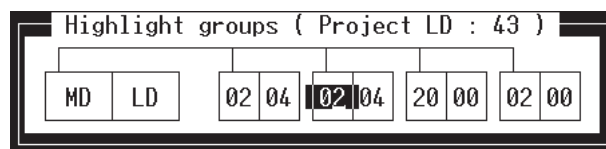


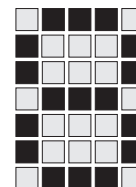
Fig. 8-30: Bus structure “Display groups”

## “With group highlight”

This format will highlight all the I/O-Devices belonging to the same I/O-Group as the I/O-Device at the cursor position. If the cursor is positioned on an LD, all the I/O-Devices belonging to I/O-Groups assigned to that LD will be highlighted.

## “W/o group highlight”

If you select this format, the group marking will be deleted. This revokes the selection of the menu item “With group highlight”.



## Information window

During configuration you can call up a number of windows containing information about the modules.

### Overview

This window is called up by activating the bus window, pressing F7 and selecting “Overview”. If the MD is highlighted in the bus window, only information on the MD will be displayed. If an LD is highlighted, all LDs will be displayed. If an I/O-Device is highlighted, all bus subscribers will be displayed.

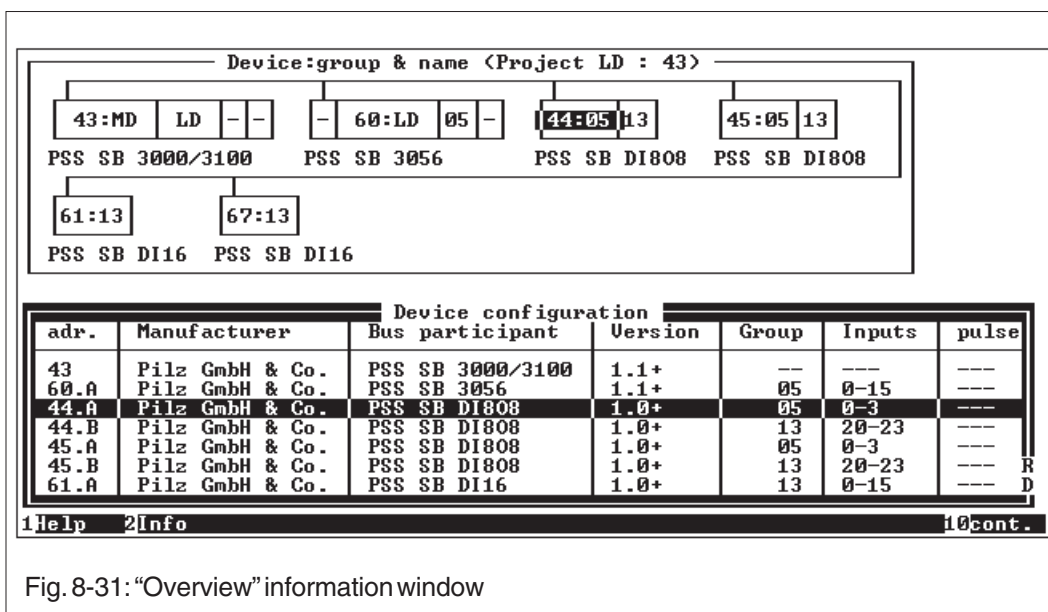


Fig. 8-31: “Overview” information window

When the window is activated, use the arrow keys to move the cursor around the window. You can switch between the displayed windows using the TAB key. Additional columns will come into view by moving the cursor to the right. To access a device's input window, highlight the device in the list and press ↵.

# FS Configurator

## Information on a device

It is possible to scan targeted information on each device. Move the cursor in the bus window or in the “Overview” window on to the device and press F2.

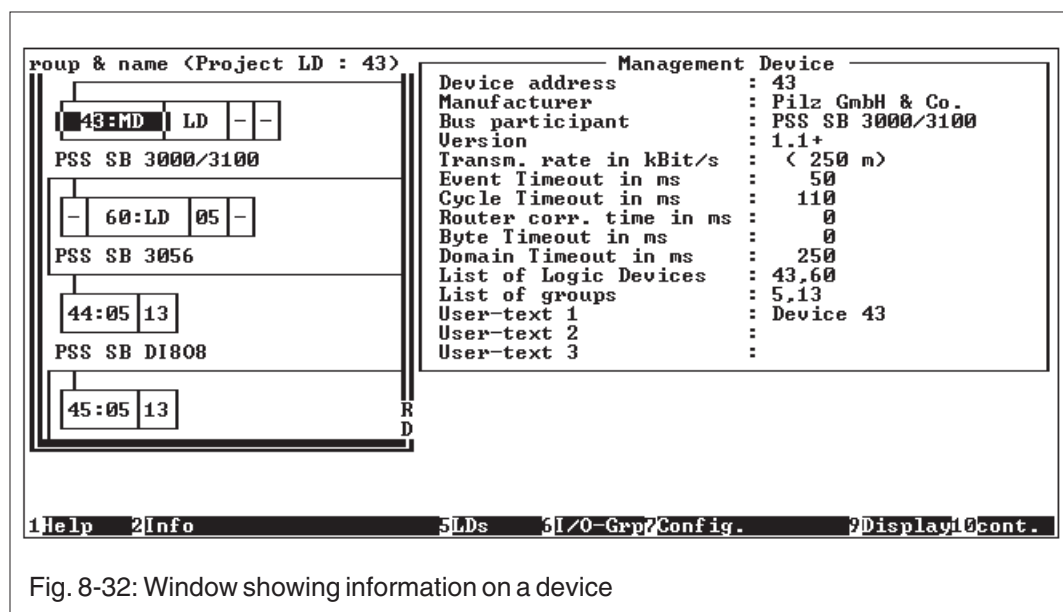
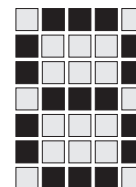


Fig. 8-32: Window showing information on a device

The displayed values cannot be amended in this window. If you want to change the values, move the cursor in the bus window or “Overview” window on to the device and press ↵. A window will appear, in which you can modify a number of settings. Some of the values cannot be changed for technical reasons.





---

## Configuration test

A configuration test can be carried out at any stage of the configuration. Activate the bus window, press F7 and select “Configuration test”. This will provide information on whether the I/O-Groups are correctly configured, whether access rights have been assigned correctly, etc. If configuration errors are displayed, these will need to be rectified before the project can be linked.

## Transfer SafetyBUS p configuration to all LDs on the bus

The SafetyBUS p configuration must be stored in each Logic Device on the bus.

### If the bus contains just one LD

- Configure SafetyBUS p and the PSS (basic data, hardware registry, etc.)
- Write the user program
- Link the project and load it into the PSS. The PSS will automatically receive the device address of the Logic Device. No further settings are required on the PSS itself.

### If the bus contains several LDs

Programming the first PSS:

- Configure SafetyBUS p
- Activate the bus window and use the arrow keys to move the cursor to the LD (PSS) whose user program you wish to create first.
- Press F7. A window appears, showing several menu items.
- Select “Assign LD to project”. The device address of the selected Logic Device will appear.
- Configure the selected PSS (basic data, hardware registry, etc).

# FS Configurator

---

- Write the user program
- Link the project and load it into the PSS. The PSS will automatically receive the device address of the selected Logic Device. No further settings are required on the PSS itself.

Programming the remaining PSS systems:

- Create a new project for the next PSS you wish to program (select “Change project” from the “FS Project” menu)
- Call up the configurator, determine the PSS type and then call up the SafetyBUS p configurator
- Press F7, select “Import” and enter the directory of the first project. The entire SafetyBUS p configuration will now be copied into the new project.
- Activate the bus window and use the arrow keys to move the cursor to the LD (PSS) whose user program you now wish to create
- Press F7 and select “Assign LD to project”. The device address of the selected Logic Device will appear. On no account may the SafetyBUS p configuration be amended now, otherwise the configurations on the LDs would be different. Exception: an alarm configuration may be made/amended for the LD.
- Configure the selected PSS (basic data, hardware registry, etc.), write the user program, link the project and load it into the PSS. Again, the PSS will automatically receive the device address of the selected Logic Device.

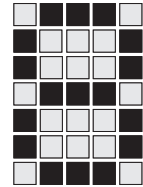
Repeat the process for all LDs (PSS) on the bus.



## INFORMATION

If changes need to be made to the SafetyBUS p configuration at a later date, follow the instructions below:

- If there are no alarm configurations for the individual LDs: make the changes in one LD and import into the other LDs.
- If there are alarm configurations for individual LDs: make the changes in each LD. Be very careful to ensure that the SafetyBUS p configuration is really identical in all the LDs.



---

## Importing an existing configuration

If you wish to generate a new project and a project with a similar or identical bus structure is already available, you can import the existing configuration and make any necessary changes.

- Activate the bus window and press F7. A window appears, showing several menu items.
- Select “Import”.
- Select the configuration you wish to import.

## Exit configurator

Press F10 in the “Configurator” window. Any configuration errors will now be displayed. To rectify the errors:

- Use the cursor to highlight the error you wish to rectify and press ↵. The cursor will immediately jump to the location of the error in the configurator
- Rectify the error. If you exit the configurator by pressing F10, any remaining errors will be displayed.
- Repeat the process until all the errors have been rectified.

If there are no errors, or if you wish to exit the configurator despite the errors, press F10 again.

The following prompt will appear:

“Save modified configuration (Y/N/ESC)?”.

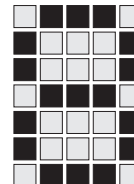
Press:

- “Y”, if the entries in the configurator are to be saved
- “N”, to exit the configurator without saving the changes
- “ESC”, to remain in the configurator.



### INFORMATION

It is possible to print out the configuration in order to check the entries. For details please refer to Chapter 9, “FS: Print configuration” and “Build SafetyBUSp configuration”.



# FS Configurator

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**Notes**

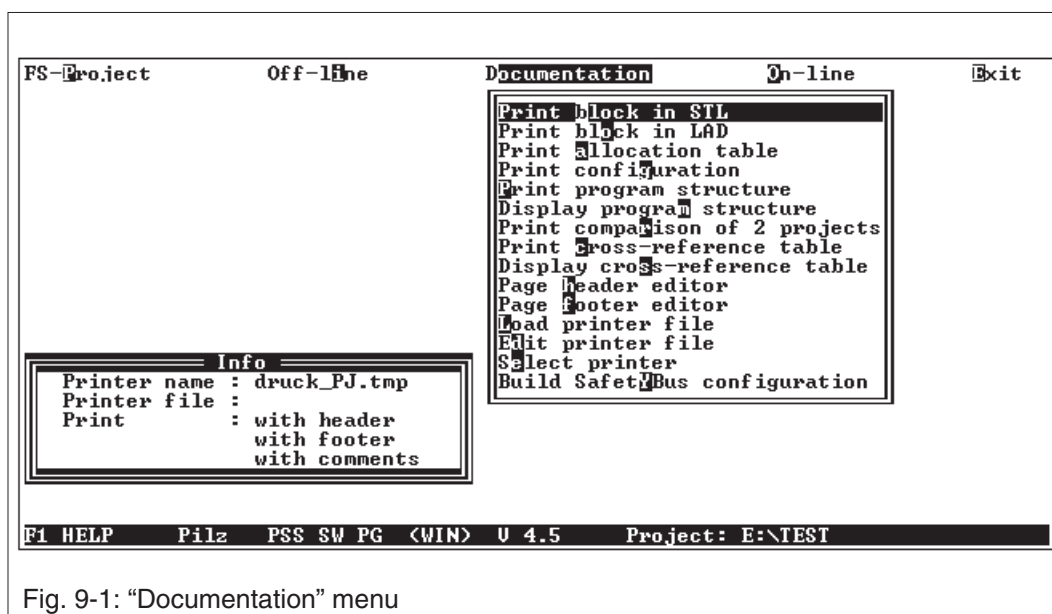


# Documentation

The “Documentation” menu provides various options for displaying a project or parts of a project:

- Print blocks and allocation tables
- Display or print program structure
- FS: print configuration
- Display or print cross-reference table
- Document printout with header and footer.

**Please note:** A printer file that conforms to your printer type must be loaded.



The SafetyBUS p configuration can also be stored in an HTML file (see Online help).

## Printer file

Special printer files (drivers) are required to initialise and drive the printer. A number of these files are available within the program.

# Documentation

---

## Load printer file:

- Select “Load printer file” from the “Documentation” menu. A list will appear, showing the available printer files.
- Use the arrow keys to select a suitable file and confirm by pressing ↵.

If there is no suitable file in the list, you can create a new printer file using the option “Edit printer file”.

## Edit printer file

This editor enables you to create a printer file that is specially adapted to your printer. See your printer manual for the relevant control characters.

### Procedure:

- Select “Edit printer file” from the “Documentation” menu. A list will appear, showing the available printer files. The current file will be highlighted.
- Press ↵. The current printer file will be shown in an editor screen.

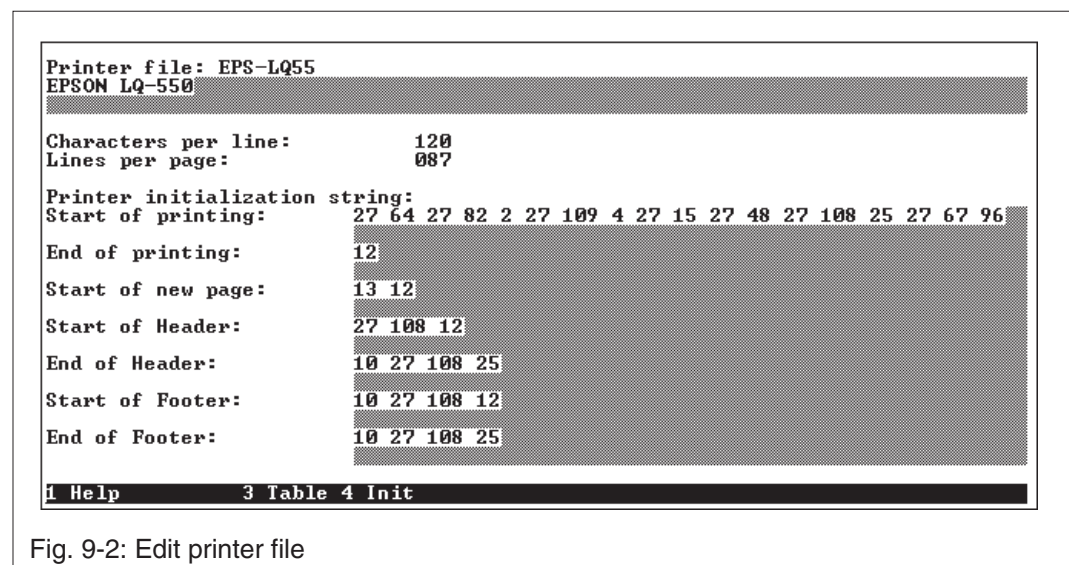
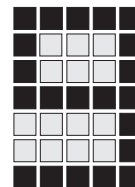


Fig. 9-2: Edit printer file

- Overwrite the name and the control characters, or delete the entries by pressing F4.



- Enter a new name in the first line ("Printer file") and confirm by pressing ↵.
- The next two lines are available for entering a comment.
- Please refer to your printer manual for information on the number of lines and characters. If you enter the maximum value there will be no margin, or only a very small margin set by the printer. If you select a lower value the margin will be correspondingly wider.
- Control characters  
Control characters define the start of a new line, plus the start and end of a header or footer. Please refer to your printer manual for details of the control characters you will need. Enter the decimal code for the control characters. Always enter a space between the coded characters.  
Example: The command for "Reset" is defined by decimal code 27 69.  
Enter: "27" "space" "69".  
The space bar has been used to separate the coded characters.
- Convert code:  
Press F3. A code conversion table will appear, showing all the IBM-ASCII characters that can be displayed. The left-hand column contains the decimal code of the IBM-ASCII character; the right-hand column contains the code for the character outputted by the printer.  
If your printer does not recognise IBM-ASCII characters, you will need to enter the printer character that corresponds to the IBM-ASCII character in the right-hand column. These features will then not need to be taken into account when you edit the printer file.  
Press F4 to reset the table. The original status will be restored.

## Select printer

The file to be printed is redirected to the file "druck\_PJ.tmp" as standard. This file is stored in the project directory. If the file is to be printed, the "Select printer" function must be activated. A window will appear, with the following options:

# Documentation

---

- Network printer  
Enter the name of the network to which the printer is connected.
- Printer  
Enter the destination printer or interface.
- Redirect to PG-DIR/Project-DIR  
Print is diverted to a file called “druck\_PG.tmp” or “druck\_PJ.tmp”.

## Header, footer

Each printout can have a header and a footer. These may consist of up to eight lines and may contain any type of text. Variables are available for inserting the current date, the date the file was created, the name of the project and block, and the page count. In the print-out, these variables will automatically be replaced with the current values.



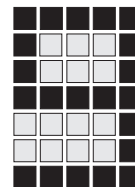
### INFORMATION

If you wish to include a header or footer when you print a block, you will need to have selected “Hardcopy: with header/footer” under “Default settings” in the “FS project”/“ST project” menu. If this option has been selected but no header/footer has been edited, the block will not be printed.

### Procedure:

- Select “Page header (footer) editor” from the “Documentation” menu. A dialogue box will appear, enabling you to enter text. A maximum of 8 lines are available. The number of columns (characters per line) will depend on the printer you have selected. If your header/footer is to be smaller than this you can modify the default size by pressing F2 and F3.
- Enter the text for the header/footer. Use the arrow keys to move the cursor.
- Delete characters: press F7. The cursor will act as an eraser.
- Delete header/footer. Press F10 and select “Delete field”.





- Quit header/footer: Press “ESC”. You will receive the prompt “Changed, save? Y/N/ESC”. Press “Y” to save your entries and “N” to exit the editor without saving. Confirm by pressing ↵.

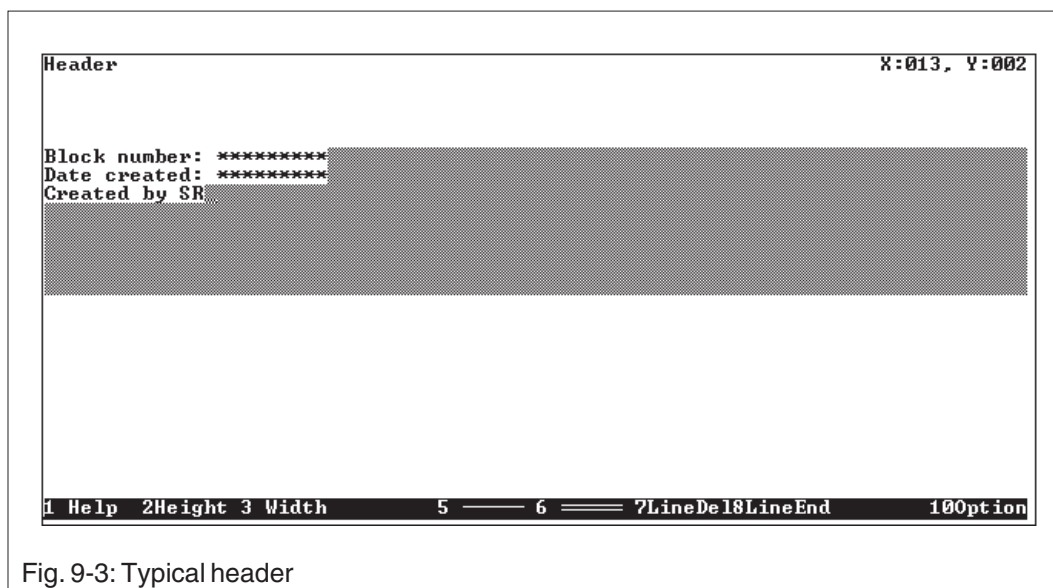


Fig. 9-3: Typical header

- **Character mode**

- Draw lines: Press F5 (single line) or F6 (double line). Use the arrow keys to move the cursor. Each time a key is pressed the character will be shown as a line.
- Exit character mode: Press F8.

- **Enter variable**

- Move the cursor to the position at which the variable (date, name) is to be inserted and press F10. Select the required variable and confirm by pressing ↵. The program will insert a special character in the header/footer as an ID for the variable.
- Delete variable line: Move the cursor to the variable line to be deleted and press “DEL”.



### INFORMATION

You can also import a header/footer from another project. To do this, select “Import header/footer” from the “Import blocks” option under the “FS-Project” or “ST-Project” menu.

# Documentation

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## Print block

Blocks can be printed in STL or LAD format, with or without comment and with or without header (footer):

Select “Default settings” from the “FS project”/“ST project” menu. A selection window will appear. The selected option will be ticked.

Make sure the relevant printer file has been loaded.

## Print any block

Any block stored in the current project can be printed:

- Select “Print block in STL” or “Print block in LAD” from the “Documentation” menu. A selection window will appear (Fig. 9-4).
- Select the block type. Use the arrow keys to highlight “Select OB (PB, FB, DB or SB)” and confirm by pressing ↵. A window will appear, showing a list of available blocks.
- Highlight the block number you require and confirm by pressing ↵ or highlight several blocks: press “+” after highlighting a block, use the arrow key to select the next block to highlight and press “+” again, etc.
- When you select a block a dialogue box will appear, enabling you to select where to start printing. Select “All” if you wish to print the whole block. Select “Partially” if only part of the block is to be printed. In this case you should enter the number of the first and last segment.

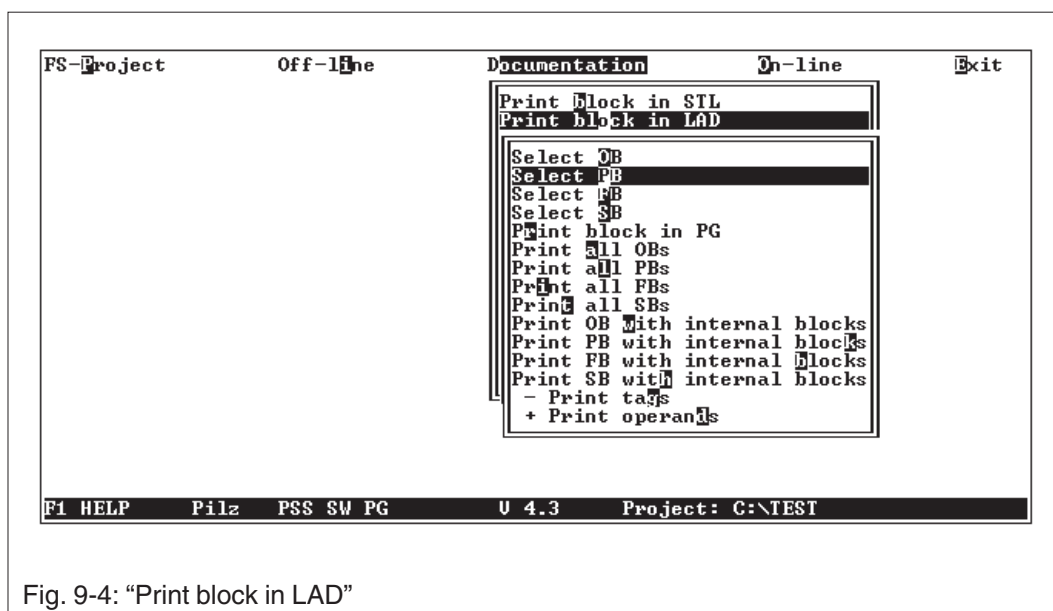
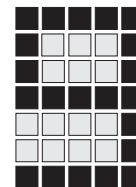


Fig. 9-4: "Print block in LAD"

## Print current block

The block that is currently loaded in the programming device's RAM will be printed:

- Select "Print block in STL" or "Print block in LAD" from the "Documentation" menu. A selection window will appear.
- Select "Print block in PG". A dialogue box will appear, enabling you to select where to start printing.
- Select "All" if you wish to print the whole block. Select "Partially" if only part of the block is to be printed. In this case you should enter the number of the first and last segment.

## Print all blocks

All blocks of a particular type within the current project will be printed:

- Select "Print block in STL" or "Print block in LAD" from the "Documentation" menu. A selection window will appear.
- Select "Print all OBs (PBs, FBs, DBs or SBs)".

# Documentation

---

## Print block with internal blocks

This option will print out a specific block and all the blocks that are called within it:

- Select “Print block in STL” or “Print block in LAD” from the “Documentation” menu. A selection window will appear.
- Select “Print OB (PB, FB, DB or SB) with internal blocks”. A window will appear, showing a list of available blocks.
- Highlight the number of the required block and confirm by pressing ↵.

## Print allocation table

Under this option you can print out the full allocation table for the current project. You can also select to print the allocation of individual operand types (inputs, outputs, flags or timers and counters).

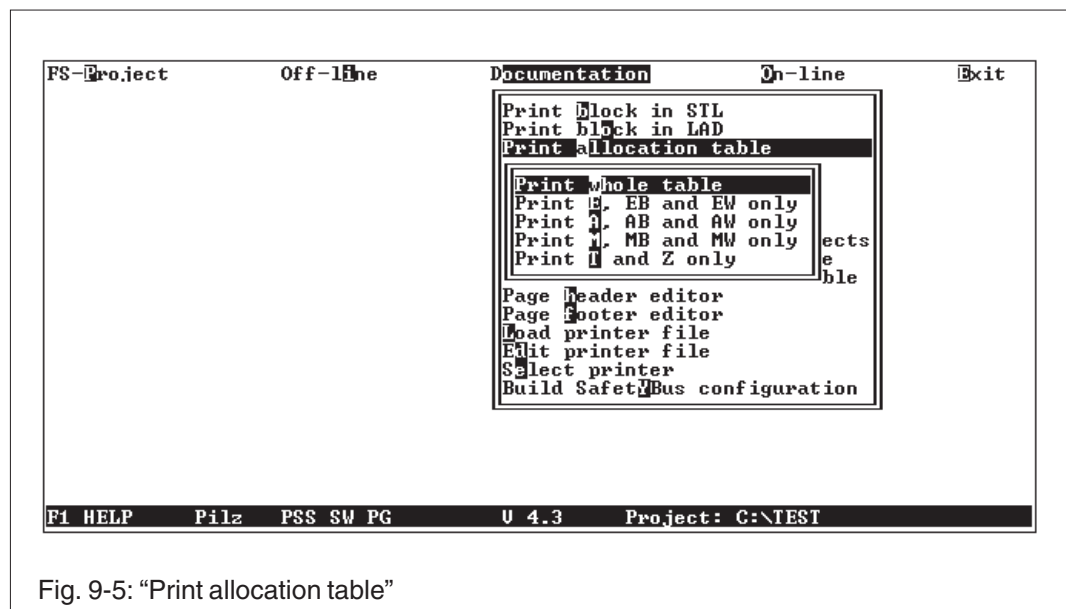


Fig. 9-5: “Print allocation table”

### Procedure:

- Select “Print allocation table” from the “Documentation” menu. A selection window will appear.
- Print whole table: Select “Print whole table”.
- Print part of table: Select “Print E, EB, EW/A, AB, AW/M, MB, MW) only” or “Print T and Z only”.



## FS: Print configuration

Under this option it is possible to print out the configuration of the current project.

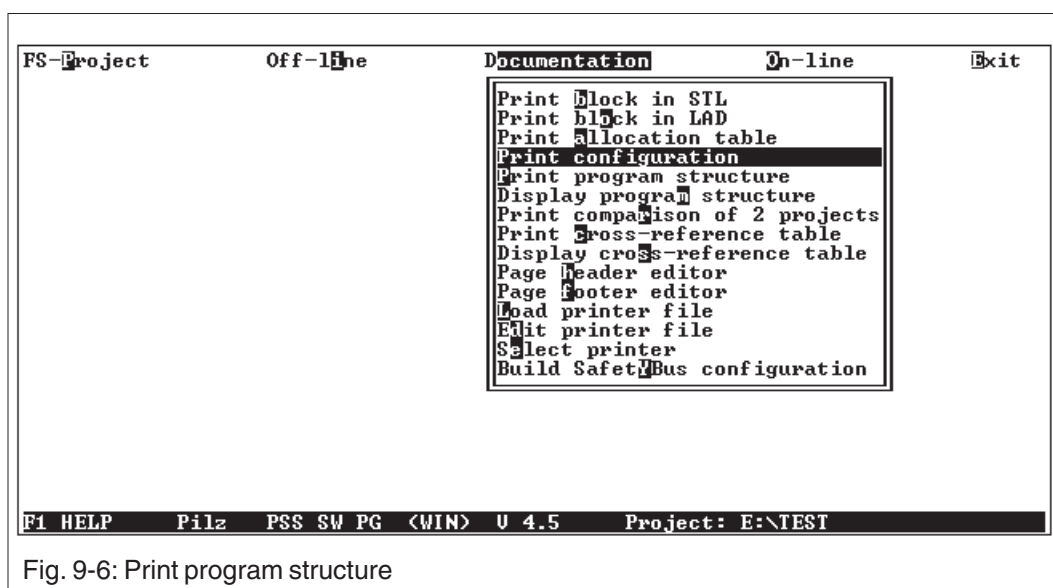


Fig. 9-6: Print program structure

### Procedure:

Select "Print configuration" from the "Documentation" menu.

# Documentation

---

## Print program structure

The program structure shows the branches of all the blocks available within a project.

The program structure can be printed or displayed. Use “PgUp” and “PgDn” to scroll through the pages.

- **Print**  
Select “Print program structure” from the “Documentation” menu.
- **Display**  
Select “Display program structure” from the “Documentation” menu.

The program structure is divided into levels. The highest level, E0, contains all the OBs. Blocks called from within the OB will be displayed in the second level, E1. Blocks called from within these are classified into the third level, E2, and so on.

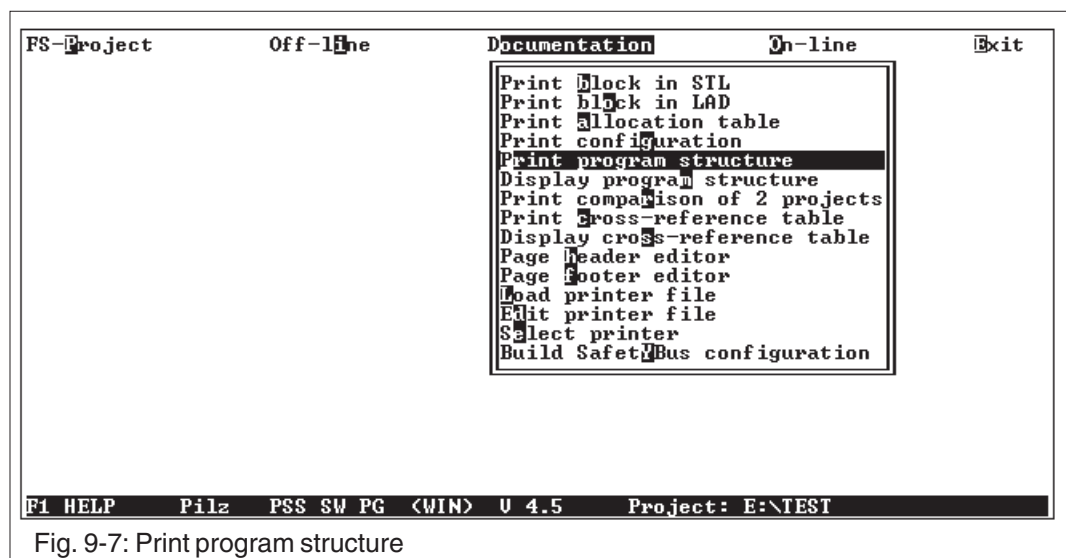
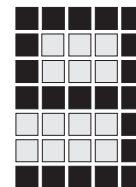


Fig. 9-7: Print program structure



## Print comparison of two projects

If you select “Print comparison of 2 projects” from the “Documentation” menu, a list will be printed showing all the blocks in which the two projects differ; the actual differences will also be printed.

Procedure:

- Select “Print comparison of 2 projects”
- Enter the directory of the project that is to be compared with the current project
- If you have used the print function since the system software was called up, the settings used for that print-out will be used to print the comparison. If not, you will be prompted to enter a printer / file for printing.

The print-out can be explained as follows:

- The print-out starts with a list containing all the blocks in which the two projects differ.
  - “-----” means that the block is only found in the other project
  - “\*” highlights the newer block, if blocks are found in both projects.

Example:

..\A1	List of differences	..\A2
OB101 13.01.99 03:15	* OB101 10.08.99 16:18	
OB120 29.03.97 08:42	* OB120 10.08.99 16:19	
OB140 16.05.98 20:28	-----	-----

- A print-out of the differences in the individual blocks will follow. The print-out will only highlight differences within blocks that are found in both projects.

The list will also show the block segments / data words in which the blocks differ (“BS/DW differences”). If the list begins with “-----”, a difference has been found even before the first block segment.

After the list, the segments and data words that show differences will be printed out. The block segment lines that are different will be marked with a “\*”.

Block segments will not be printed out if the blocks are encrypted.

# Documentation

## Print cross-reference table

The cross reference table displays the operands and tags for a project, showing which block they are used in, or the blocks within a project and the blocks called from within them.

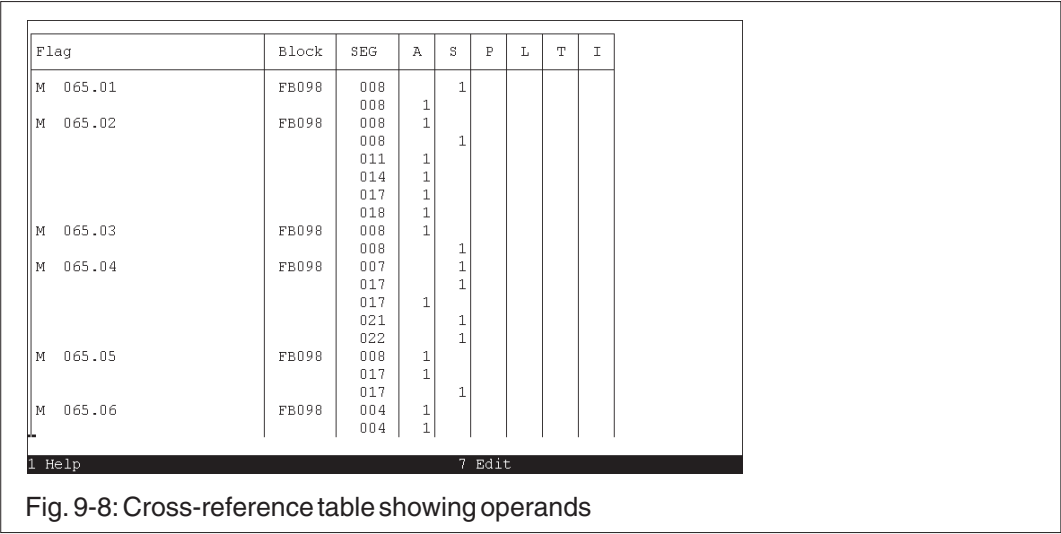


Fig. 9-8: Cross-reference table showing operands

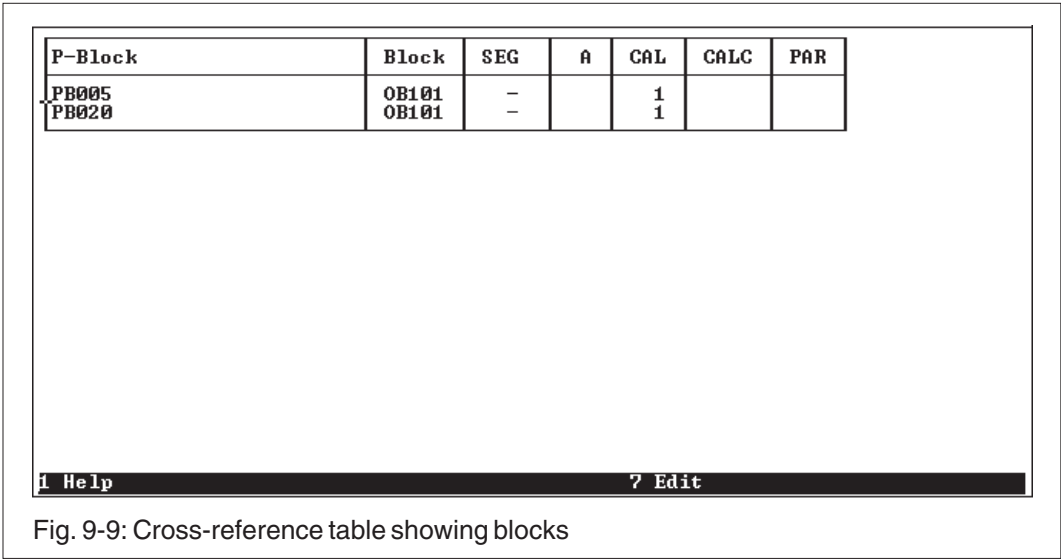
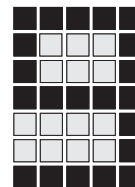


Fig. 9-9: Cross-reference table showing blocks





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The abbreviations in the columns show how often (per segment / block) the following occurs:

- A the status of the operand is polled,
- S the status of the operand is changed,
- P parameters are set for the operand,
- L the contents of the operand is loaded into the accumulator,
- T the contents of the operand is changed,
- I the operand is used as an address indicator (indirect addressing).

**Please note:** In the case of data words, the allocation to data blocks is not stated.

The cross-reference table can be printed or displayed. Use “PgUp” and “PgDn” to scroll through the pages.

- **Activate the block editor**

The block editor can be activated in the cross-reference table. Highlight a block using the arrow keys and confirm by pressing F7. The highlighted block will be displayed in the block editor.

- **Print**

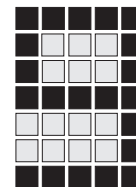
Select “Print cross-reference table” from the “Documentation” menu.

- **Display**

Select “Display cross-reference table” from the “Documentation” menu.

- **Operand range**

- Choose “Select operands”. A dialogue box will appear.
- Enter the operand at which the print-out should start and confirm by pressing ↵. Enter the operand at which the print-out should end and confirm by pressing ↵.  
Example: first operand: E6.00, last operand: E8.00.  
All input bits between E6.00 and E8.00 will be outputted.



# Documentation

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- **Block range**

- Choose “Select blocks” from the selection window. A dialogue box will appear.
- Enter the block at which the list should start and confirm by pressing ↵. Enter the block at which the list should end and confirm by pressing ↵. Please note: OBs cannot be displayed in the cross-reference table. Example: first block: PB 20, last block: PB 30. All blocks between PB 20 and PB 30 will be outputted.

- **Constant range**

- Choose “Select constants” from the selection window. A dialogue box will appear.
- Enter the constant at which the list should start and confirm by pressing ↵. Enter the constant at which the list should end and confirm by pressing ↵. Example: first constant: KB 1, last constant: KB 60. All constants between KB 1 and KB 60 will be outputted.

- **All operands**

Select “All operands” from the selection window. The cross-reference table will be displayed, showing all the operands contained in the project.

- **All blocks**

Select “All blocks” from the selection window. The cross-reference table will be displayed, showing with all the blocks contained in the project.

- **All constants**

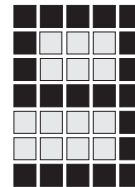
Select “All constants” from the selection window. The cross-reference table will be displayed, showing all the constants contained in the project.

- **Indirect address indicators**

Select “Indirect address pointers (MW)” from the selection window. A list will show which indirect address indicators are used in which blocks.

- **Operand type**

- Choose “Select operand/block type” from the selection window. A dialogue box will appear.
- Use the arrow keys to select the operand types to be displayed and confirm by pressing ↵.



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- **Instructions**

- Choose “Select instructions” from the selection window. A dialogue box will appear.
- Use the arrow keys to select the instruction group to be displayed and confirm by pressing ↵.

## **Build SafetyBUS configuration**

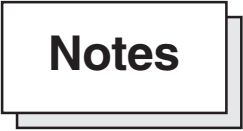
The SafetyBUS p configuration can be stored in an HTML file. Activating the “Build SafetyBUS configuration” function generates the file “projekt.htm”. The file name corresponds to the project name.

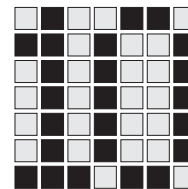
This HTML file can be displayed or printed using a Web-Browser (e.g. Netscape 4.x, Internet Explorer 5.x, ...) or any other HTML-compatible program (e.g. Start Office, MS Word, ...).

As is standard with HTML files, the HTML file generated by the system software will contain links, enabling easy navigation, even through larger SafetyBUS p configurations.

# Documentation

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## Program Transfer

The PSS safety system communicates with the programming device in on-line mode, provided the computer containing the system software is connected to the PSS. The PG interface on the PSS can be either RS 232 or RS 485 (please refer to the Installation Manual of the relevant PSS). If the PG interface on the PSS and the interface on the programming device are different, the connection will need to be made using an interface adapter.

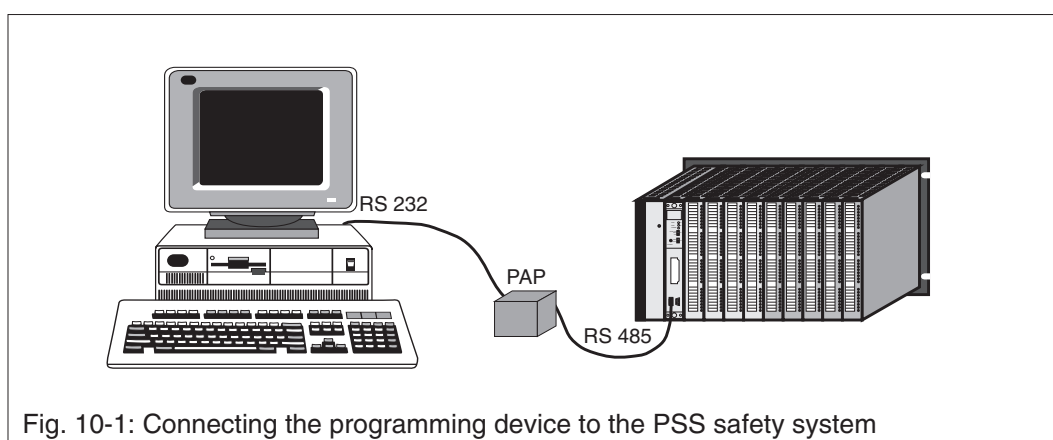


Fig. 10-1: Connecting the programming device to the PSS safety system

In the “Project” menu under “Default settings”, you need to enter the serial interface to be used for communication: select between COM1, COM2, COM3 or COM4.

When the correct interface is set, you can select the “On-line” menu and access online mode.

If the programming device does not receive feedback from the PSS after a defined period of time (online timeout), a message will be displayed on screen and an online connection will not be possible. Settings for the online timeout can be made under “Set online timeout”, under “Default settings” in the “Project” menu.



### INFORMATION

If you experience problems with your online connection, the flow charts in the Appendix may be of some assistance. These can be found in the section entitled “Troubleshooting the online connection”.

# Program Transfer

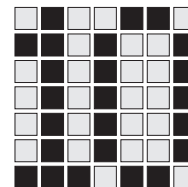
## FS: Program transfer

Please note: A linked program must be available on the programming device.

- Set the “FS” selector switch on the PSS to “STOP” or stop the PSS using the “Stop PSS” option from the “Online” menu (see Chapter 10, section entitled “Start/stop PSS”).
- If necessary, clear the PSS program memory. Select “Delete FS program” from the “On-line” menu.
- Select “FS program => Harddisk => PSS” from the “On-line” menu. The linked program will be transferred to the PSS memory.



The program will start up as soon as the “FS” selector switch is moved to “RUN”, or as soon as you select the option “Start PSS” from the “Online” menu (see Chapter 10, section entitled “Start/stop PSS”).



---

## FS: Upload program from PSS

The program transferred to the PSS safety system can be uploaded back to the programming device, provided the name has been set up for the project that is to be transferred:

- If the name of the project is known:  
Select “Change project” from the “FS project” menu and then select the required project name. The project name needs to be available on the programming device but the program does not have to be saved under this name.
- If the name of the project is not known:  
Select “Program comparison” from the “On-line” menu. The current program on the programming device will be compared with the program on the PSS. If the programs are identical, this means that the correct project name has been set and you will be able to upload the program. If the programs are different, you will receive a message showing the name of the program currently on the PSS. This project name can then be entered under “Change project” in the “FS project” menu.
- Select “FS program : PSS” => harddisk” from the “On-line” menu.  
The program will be transferred to the programming device.

# Program Transfer

## ST: Transfer blocks

The option “Transfer blocks to the PSS” enables you to transfer blocks created using the programming device to the PSS program memory and also to clear blocks from the PSS program memory.

- Set the “ST” selector switch on the PSS to “AUTO PG” or “PG”. The status line on the programming device provides information on the contents of the CPU display with the message “CPU-Display: xxxx”.
- Select “Transfer blocks to the PSS” from the “On-line” menu. A menu will appear.

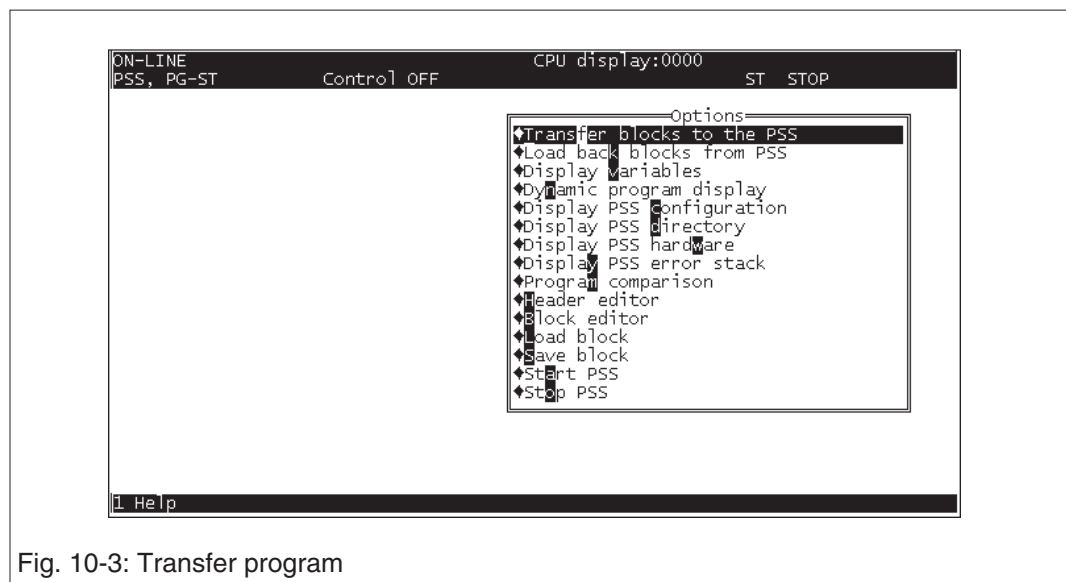


Fig. 10-3: Transfer program

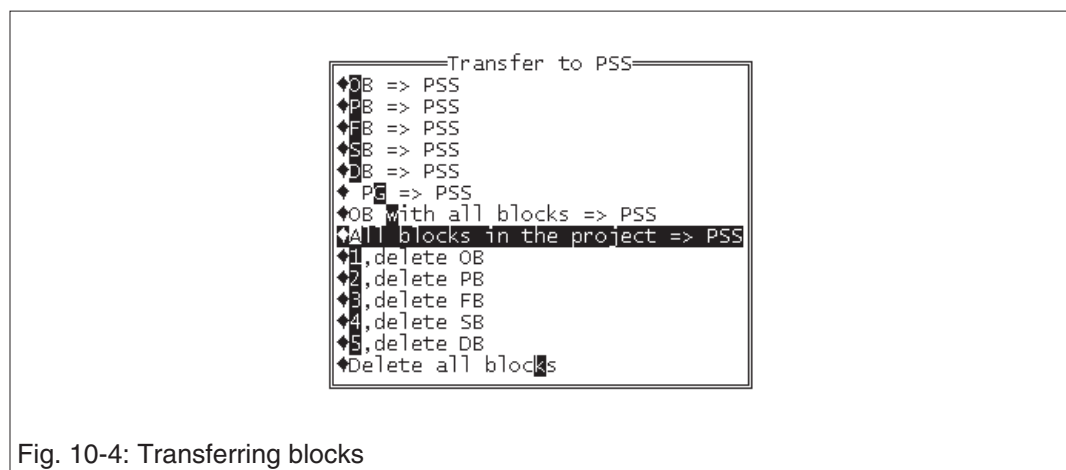
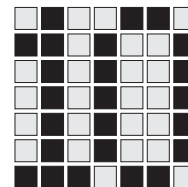


Fig. 10-4: Transferring blocks





- Transfer selected block  
Select “XB -> PSS” from the window (XB represents OB, PB, FB, SB and DB). The available blocks of that type will be displayed in a window. Highlight the required block and confirm by pressing ↵. The selected block will be transferred from the memory of the programming device to the PSS program memory.
- Transfer all blocks  
Select “All blocks in the project -> PSS” from the window. All the blocks in the current project will be transferred to the PSS program memory.
- Transfer OB with all blocks  
Select “OB with all blocks -> PSS” from the window. All available organisation blocks will be displayed. Highlight the required block and confirm by pressing ↵. The selected OB and all blocks called from within that OB will be transferred from the memory of the programming device to the PSS program memory.



#### NOTICE

- Blocks can be loaded retrospectively in on-line mode, i.e. while the machine is running. However, you should avoid using the transfer function “All blocks in the project -> PSS” while on-line. With this function, blocks can be transferred in any sequence. This means, for example, that a program block may be transferred, which calls up a function block which is not yet available. This will trigger error S-26 and the ST section will switch to a STOP condition. For this reason, if you need to transfer blocks on-line, always transfer individual blocks in the correct sequence.
- If the FS section is running, blocks can only be transferred to the ST section using a RAM cartridge. An EPROM cartridge is too slow and would cause the FS section to stop.

# Program Transfer

---

## ST: Delete blocks

The following options are available for clearing blocks from the PSS program memory:

- Clear selected block  
Select "Delete XB" from the window (XB represents OB, PB, FB, SB and DB). The available blocks of that type will be displayed in a window. Highlight the required block and confirm by pressing ↵. The selected block will be declared invalid in the PSS program memory.
- Clear all blocks  
Select "Delete all blocks" from the window. All the blocks in the PSS program memory will be declared invalid.

## ST: Upload blocks from PSS

This option enables individual blocks in the programming device's RAM or all blocks from the current project on the programming device to be uploaded from the PSS.

- Select "Load back blocks from PSS" from the "On-line" menu. A selection window will appear.
- Upload selected block  
Select "XB -> PG" from the window (XB represents OB, PB, FB, SB and DB). The selected blocks will be displayed in a window. Highlight the required block and confirm by pressing ↵. The selected block will be transferred to the programming device's RAM.
- Upload all blocks  
Select "All blocks -> hard drive" from the window. All OB, PB, FB and SBs will be transferred from the PSS memory into the current project on the programming device.



### NOTICE

Data blocks that are selected indirectly will not be transferred.

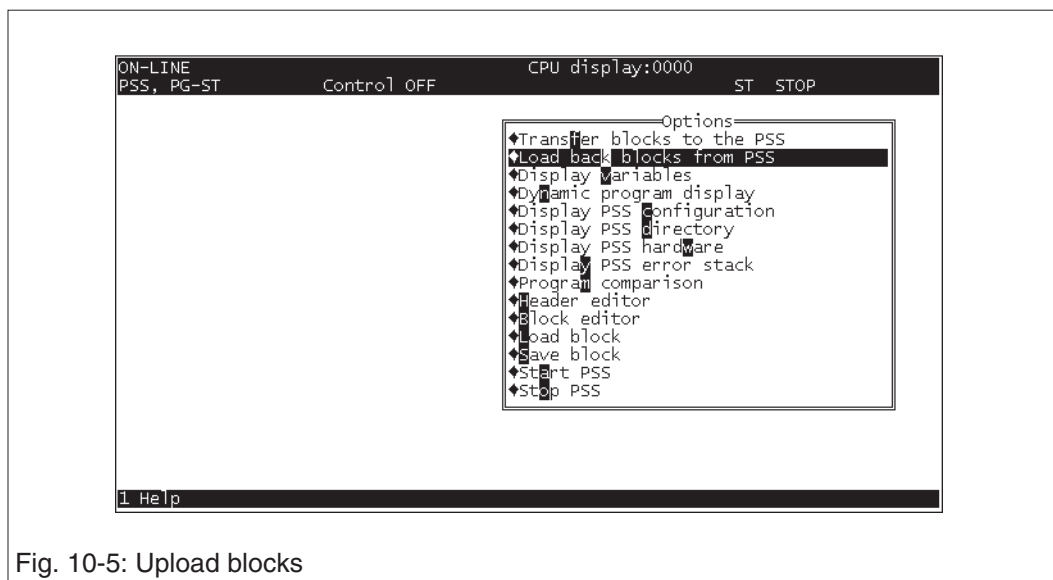
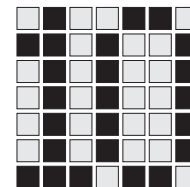


Fig. 10-5: Upload blocks

## Display directory

This option lists all the blocks from the FS/ST program that are currently stored in the PSS memory.

Select "Display PSS directory" from the "On-line" menu.

The programming device will display a screen as shown in Fig. 10-6.

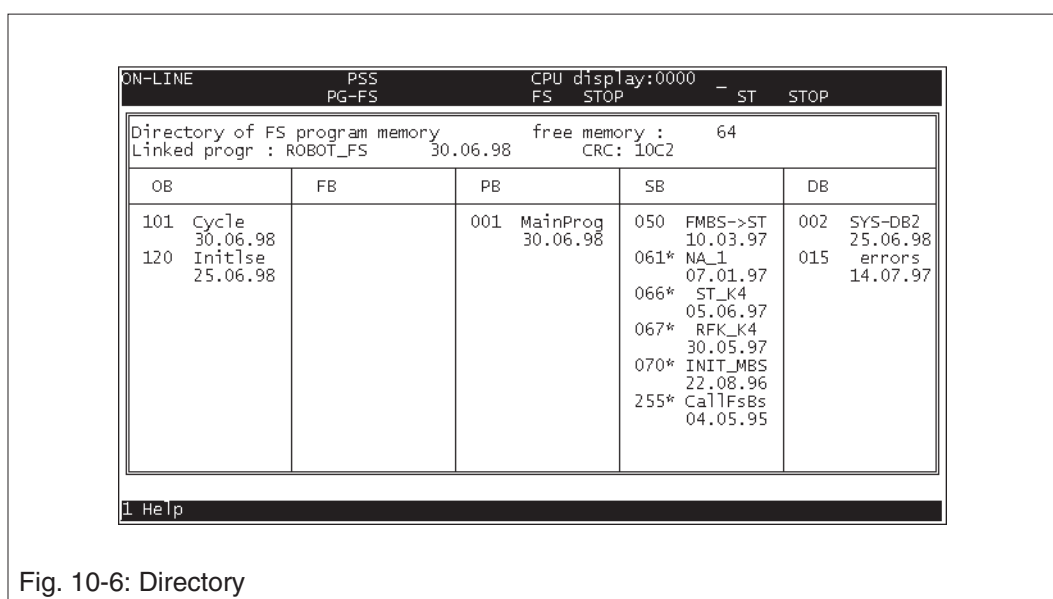
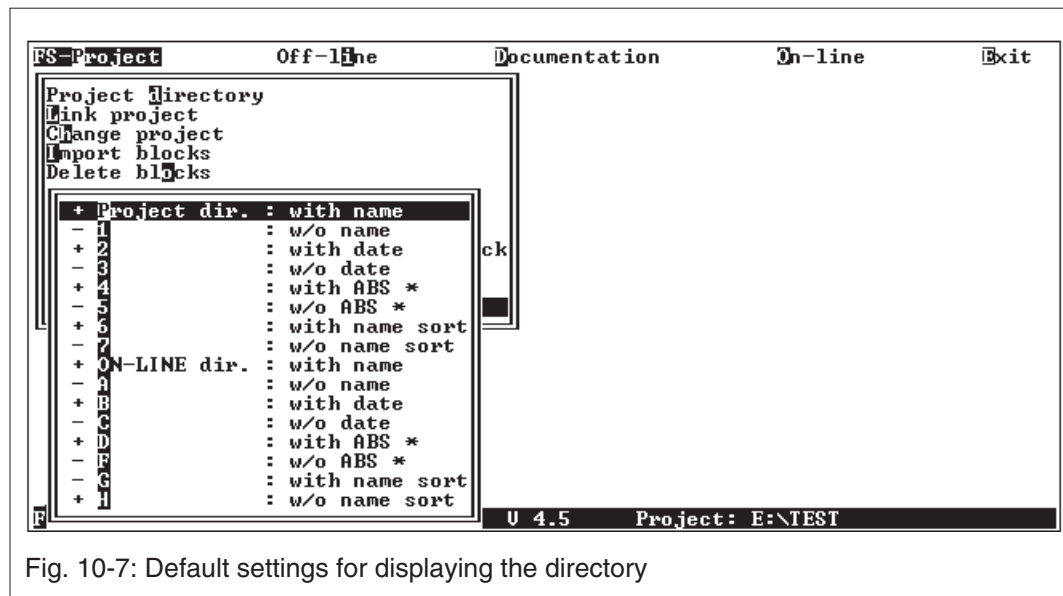


Fig. 10-6: Directory

# Program Transfer

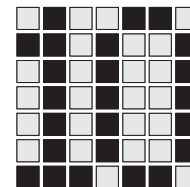


You can select the block details that are displayed in the directory and the way in which the details are sorted.

Select "Default directory settings" from the "FS project" menu. A selection window will appear. You can select between the following settings:

- "with / w/o name": blocks are displayed with/without their names
- "with / w/o date": you can choose to display/not display the date on which the block was created
- "with / w/o ABS": blocks that have been approved by BG or TÜV are marked/not marked with "\*"
- "with / w/o name sort ": in the directory, blocks will either be sorted by name or by number.

If blocks are being displayed without their name, they will automatically be sorted by number.



## Start/stop PSS

**ST section:** The ST section of the PSS can be started and stopped by operating the ST selector switch on the unit or via a command from the programming device. To do this, select “Start PSS”/“Stop PSS” from the “On-line” menu. The current status of the PSS will be displayed in the status line.

**FS section:** The FS section of the PSS can also be started and stopped by pressing the FS selector switch on the unit or via a command from the programming device. To do this, select “Start PSS”/“Stop PSS” from the “On-line” menu.



### **WARNING!**

Stopping the PSS by selecting “Stop PSS” from the “On-line” menu in the programming device does **not** guarantee that the machine will stop safely.



### **WARNING!**

Ensure that start-up cannot create a risk to man or machine.

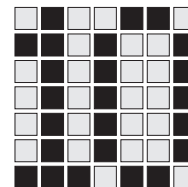
In order to be able to start and stop the FS section from the programming device, the following conditions have to be met:

- The FS selector switch must be set to RUN.
- A password must be entered for start-up.

The password is set up when the project is created in the configurator (see Chapter 8, section entitled “Start-up password”); it is then transferred to the PSS with the linked project. If the start-up password entered does not match the password stored in the PSS, an error message will appear on screen: “Start-up not possible. See error stack” and start-up will not be triggered.

If you lose the start-up password, you will no longer be able to start the FS section from the PG. A new start-up password will need to be set and this will require the project's source code. When the new start-up password has been entered, the project will need to be re-linked and transferred again to the PSS. Setting a new start-up password changes the project's CRC check sum, which means that the project in the PSS and the newly linked project will no longer be identical.

No password is required to stop the PSS.



## Program Transfer

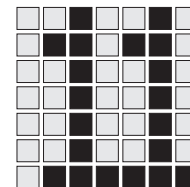
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### **WARNING!**

Only give the start-up password to those with thorough knowledge of the accident prevention measures to be taken on start-up.

- The PSS operating system must support starting and stopping from the programming device. If the PSS does not support this functionality and you attempt to start or stop the PSS, an error message: “No access rights” will appear on screen.



# Diagnostics

The system software enables you to receive current data from the PSS system in on-line mode and display it on the programming device. To do this the PSS must be in “RUN” mode and must be connected to the programming device as described in Chapter 10 (Program Transfer). In on-line mode, the status line at the top of the screen displays the contents of the PSS CPU under “CPU Display”.

## Display variables

This option allows you to view the status of inputs, outputs, flags, timers, counters and data words in on-line mode. A maximum of 32 operands can be displayed at one time. The status can be shown as bit state, fixed point number, hexadecimal number or IBM-ASCII character.

### Call up:

Select “Display variables” from the “On-line” menu. A table will appear, as shown in figure 11-1.

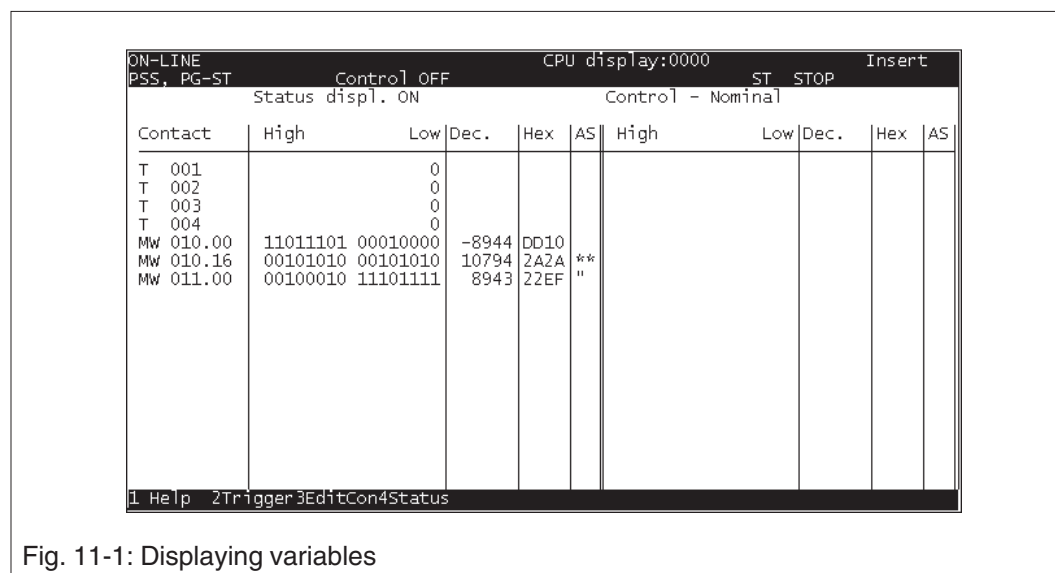


Fig. 11-1: Displaying variables

- **Enter variable**

The variables to be displayed will need to be edited: press F3 and enter the required data.

Please note: the relevant data block must be stated before the data words are entered.

# Diagnostics

---

- **Display status**

Press F4. The current status of every variable in the table will be displayed.

- **Trigger**

The trigger defines the moment at which the status is read: press F2. A selection window will appear.

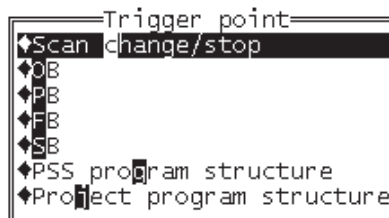
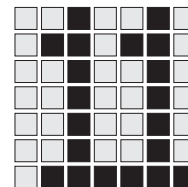


Fig. 11-2: Select trigger point

- To re-display the status at each scan change, select “Scan change/STOP”.
  - To display the status when a specific block is called up, select “OB”, “PB”, “FB”, or “SB”. Select the required block from the list of available blocks.
  - To display the status when a specific block call occurs, select “PSS program structure”. The PSS program structure will be displayed. Use the arrow keys to highlight the required block call and confirm by pressing ↵. This function will set the trigger condition on a specific block call from within the program structure, irrespective of how often the block has been or will be called up.
- The program structure and trigger information are stored in the programming device. If the structure is to be re-displayed, for example, to change the trigger point, select “Project program structure”. The program structure stored in the programming device will be displayed. It is much quicker to read the program structure from the project than from the PSS system.





### NOTICE

The command “PSS program structure” must always be selected before activating “Project program structure”. The PSS program structure will only be identical with the project program structure if no changes are made to the project using the programming device.

## ST: Force variables

It is possible to assign predefined values for a variable while the ST section is running. To do this your PSS system will need to be running a minimum of Version 11 of the operating system. You can check which version of the operating system your PSS is running by selecting “Display PSS configuration” from the “On-line” menu.

- Following the instructions given in the previous section, display the variables whose value you wish to predetermine.
- Move to the right-hand column by pressing F5 and enter the values to be assigned to the required variables.
- Press F6 to transfer the values to the variables.

## Dynamic program display

Dynamic program display shows the contents of indirect addresses, word operands, accumulators and auxiliary accumulators, together with the status of contacts and the result of logic operation (RLO). Current status display starts at the block segment containing the cursor and ends at the end of the segment, at a jump label, or a block call.

### To call up:

Select “Dynamic program display” from the “On-line” menu.

# Diagnostics

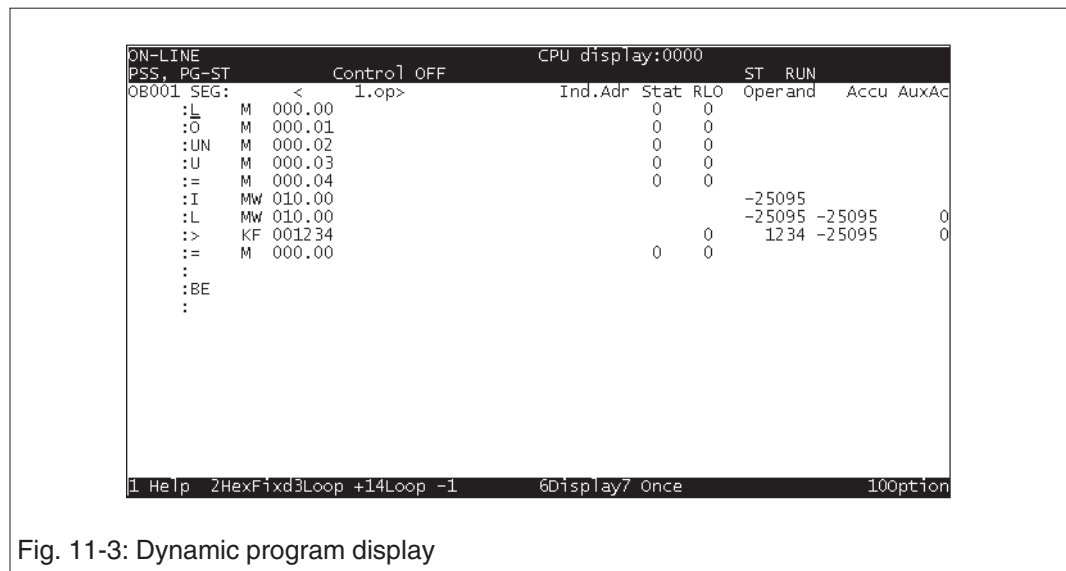


Fig. 11-3: Dynamic program display

## • Select block

- To display OB 001 or the last block to be processed on-line:  
Select "Last block displayed".
- To select any block from a selection window or from the program structure:  
Select "Block selection".
- To display any block segment:  
Select "Block segment" and enter the segment number.

## • Start dynamic display

Press F6. A window will open, as shown in Fig. 11-3.

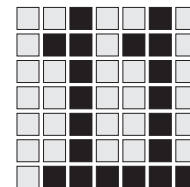
The right-hand side of the table shows:

- Ind.Adr: Contents of the indirect address (real operand address)
- Stat: Status of the contacts at bit level
- RLO: Current result of logic operation
- Operand: Contents of the word operands
- Accu: Contents of the accumulator
- AuxAc: Contents of the auxiliary accumulator

The display is continuously updated and refers to the segment highlighted by the cursor.

## • End dynamic display

Press either of the arrow keys ↓ or ↑.



---

- **Single display**

Press F7. The PSS will delete the status table after start-up. The status will be displayed again the first time the displayed program section is run after start-up.

- **Define scans**

If the block you have selected contains a loop, you can set which scan the display should occur on. The current number of scans is displayed in the third column of the program display.

- Press F3 to decrease the number of scans by 1.

OR

- Press F10 and select “No. of scans”. A window will appear, enabling you to enter the number of scans. Enter the required value and confirm by pressing ↵.

OR

- Press F10 and select “Last scan”. The status as the last scan is cycled will be displayed.

- **Coding**

The table can be displayed in hexadecimal code or in fixed point numbers. Use F2 to switch between the two types of coding.

- **Locate block sections**

Large blocks cannot be displayed in full on screen. The following options are available for displaying sections of a block:

- “Search for block segment/label” to display a block segment.
- “Search for jumps” to show jumps within a block.
- “Search operand” to display an operand from a block.
- “Search block” to display a block call within a block.

Procedure:

- Press F10 and select the required option. A dialogue box will appear.
- Edit the required label and confirm by pressing ↵. If the label is found the system will ask if it should continue the search.

# Diagnostics

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- **Switch block**

- Press F10 and select "Block selection". A selection window will appear.
- Highlight the required block type and confirm by pressing ↵. In the selection window, highlight the block number and press ↵. The current status of the selected block will be displayed.

- **Edit and transfer block**

- Press F10 and select "Edit BS and transfer".

FS: With FS programming, this function can only be used when the project in the PSS is identical to the project in the programming device.

## Compare program

This option enables you to compare two projects. The blocks are shown opposite each other and the differences displayed.

**Procedure:**

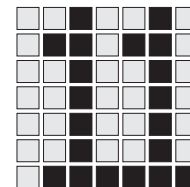
Select "Program comparison" from the "On-line" menu. All the blocks in the project on the PSS system will be compared with the current project on the programming device. Blocks that do not match will be listed, showing the date and time they were created.

ST: Blocks showing differences can be loaded from the programming device to the PSS by pressing F3 (LOAD).

## Display PSS status

In on-line mode, the system software has a number of options for obtaining information about the connected PSS system.

- Configuration
- Hardware registry
- Error stack



---

## Configuration

The following information is listed in a table: hardware and software versions, program memory size, battery status and PSS status. With the FS section, the maximum program run time for both the standard and failsafe section is also displayed, together with the minimum scan time. Select “Display PSS configuration” from the “On-line” menu.

## Hardware registry

Displays the slot layout in table format. Select “Display PSS hardware” from the “On-line” menu.

## Error stack

Displays the current error stack. Select “Display PSS error stack” from the “On-line” menu.

## Change project

The current project can be processed directly through the on-line menu. As with the off-line editor, the following functions are available:

- Header editor
- Block editor
- Load block
- Save block
- FS: link project.

All these options have the same functions as those described for off-line mode.

# Diagnostics

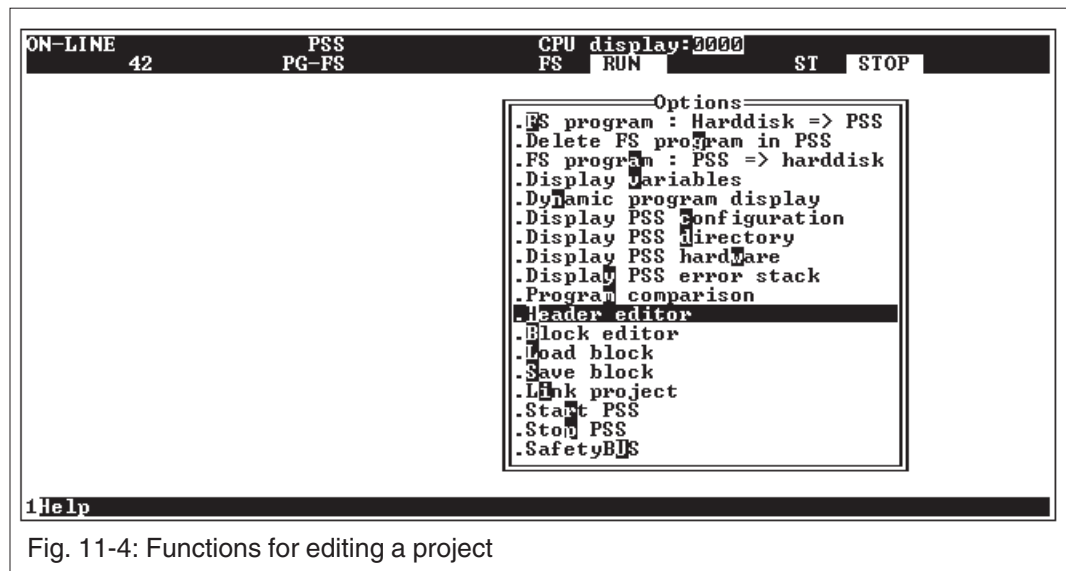
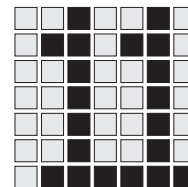


Fig. 11-4: Functions for editing a project

**When programming the FS section, please note:** A project can only be transferred in its linked form. The PSS safety system must be in a STOP condition.



---

## SafetyBUS p

It is possible to call up a variety of information from SafetyBUS p during operation. It is also possible to start or stop individual groups and to assign device addresses to bus subscribers.



### NOTICE

Make sure that the project in the programming device is identical to the project in the PSS safety system. This is the only way to ensure that correct information is supplied via SafetyBUS p in online mode.



### INFORMATION

The displayed information is updated every 10 seconds.  
The update is suspended while data is being entered.

### Call up:

Select "SafetyBUS p" from the "On-line" menu.

The bus structure of the project on the programming device will be displayed on screen.

### Key to markings and display:

- Device marked white  
When you move the cursor on to this device, details of the device will be found on the bottom left of the screen.
- Device marked red  
The device is registering an error. For fault diagnostics you can display the device's error stack. To do this, move the cursor on to the device and press ↵.
- Device marked with slashes (/ / / / /)  
Device was configured but has not appeared on the bus since commissioning.
- Display on bottom right of screen

# Diagnostics

---

This shows devices which are on the bus but have not been configured.

- **Changing the display format of the bus structure**

Press F9. You can select between:

- Display groups
- Display device : group
- Display device
- Display dev : grp & name

The various display formats are described in Chapter 8, from page 8-36.

- **Read bus diagnostics**

Press F9 and select “Read bus diagnostics”.

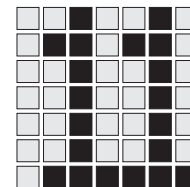
- “Actual bus load in percent”: The value indicates how high the current bus load is in relation to the cycle timeout.
- “Maximum bus load in percent”: Highest value of the “Actual bus load in percent” since the bus was started.
- “Average bus load (10 cycles)”: This value indicates the average value of the “Actual bus load in percent” in relation to the last 10 cycles.
- “Max. avg. bus load (10 cycles)”: Highest value of the “Average bus load (10 cycles)” since the bus was started.
- “CAN error: ...”: This information is the error register from the CAN-Controller. If the displayed values increase, this is a sign of a faulty bus function.

- **Read device ID**

Move the cursor to the bus device whose ID you wish to read. Press F9 and select “Read device ID”. A window will appear, showing the following details:

- Manufacturer: The name of the manufacturer is stated, or its code number. Pilz has code number “1”.
- Device type: The device type is stated, or a code number for the device type. The PSS SB DI8O8 module has code number “1”.
- Serial number
- Version number





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- **Start and stop I/O group**

It is possible to start and stop I/O groups in SafetyBUS p. For example, if an I/O group has been stopped due to an error, you can rectify the error and restart the I/O group in online mode.

- Start/stop an individual group: move the cursor in the bus to an I/O-Device belonging to the group. Press F9 and select “Start group” or “Stop group”.
- Start/stop all groups assigned to a Logic Device: move the cursor in the bus to the Logic Device, press F9 and select “Start group” or “Stop group”.
- Start/stop all the groups in the bus: move the cursor in the bus to the Management Device, press F9 and select “Start group” or “Stop group”.

- **Display error stack**

Move the cursor on to the device whose error stack is to be displayed and press ↵. If the cursor is positioned on the MD, you will receive general SafetyBUS p error messages. If the cursor is positioned on an LD or I/OD, you will receive error messages that are specific to that device.

### **Allocating a device address to a subscriber**

Units can be allocated a device address using the “Set device address” function. This function is particularly intended for devices without a physical address setting mechanism, but it can also be used to allocate a device address to units which do have a setting mechanism. If this is the case, the physical setting for the device address will need to be “00”.

The online function “Set device address” can be used when SafetyBUS p is commissioned or during operation, if you need to swap a defective unit. Once a unit has been given a device address, it is stored in non-volatile memory within the unit. The stored device address can be overwritten as often as necessary.

If a unit with a physical setting mechanism is allocated a device address using the “Set device address” function and the physical setting is then changed, the address established via the setting mechanism will be valid. The stored address will be deleted.

# Diagnostics

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Allocating a device address to a subscriber during commissioning:

- Put SafetyBUS p into operation (see “SafetyBUS p System Description”). Make sure that there are no subscribers connected that need to be allocated an address using the “Set device address” function.
- Connect the programming device to the MD on the bus system.
- From the “On-line” menu, activate the “SafetyBUS p” option. The bus structure will be displayed. Any subscriber that is not present on the bus will be marked with slashes ( / / / / ).
- Place the cursor on the device which is to be allocated an address, press F9 and select “Set device address”. If there is only one device without an address, there will be no need to highlight it with the cursor.
- Wait until the programming device prompts you to connect the subscriber to the bus.
- Connect the subscriber. This completes the address allocation.
- Repeat this process until all subscribers are connected to the bus.

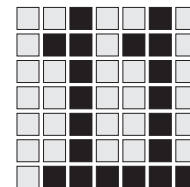


## **WARNING!**

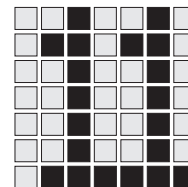
If the last device in an I/O-Group has been connected and no error is present, the I/O-Group will start automatically. Be aware that a machine may start up unexpectedly and take adequate precautions to avoid risk to man and machine.

Exchanging a defective bus subscriber and assigning a device address:

- Remove the defective bus subscriber from the bus.
- Connect the programming device to the MD on the bus system.
- From the “On-line” menu, activate the “SafetyBUS p” option. The bus structure will be displayed.
- Place the cursor on the device which is to be allocated an address, press F9 and select “Set device address”. If there is only one device being exchanged and which has no address, there will be no need to highlight it with the cursor.
- Wait until the programming device prompts you to connect the subscriber to the bus.



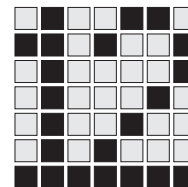
- 
- Connect the subscriber. This completes the address allocation.
  - Repeat this process until all subscribers are connected to the bus.
  - Start up all the I/O-Groups that were stopped due to the defective subscriber.



# Diagnostics

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Notes



# Appendix

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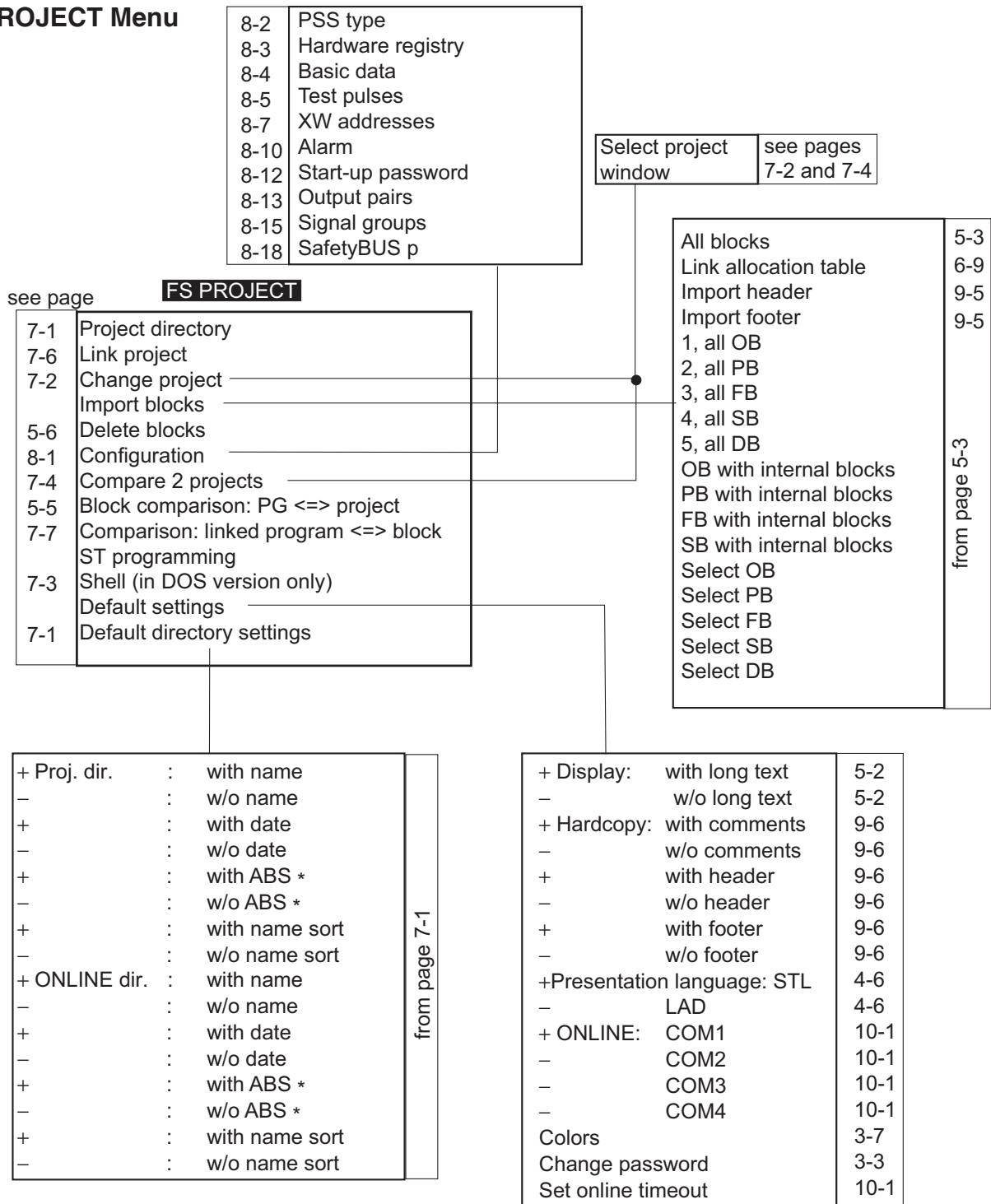
## Abbreviations

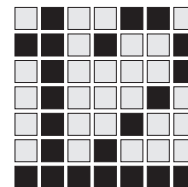
<b>A</b>		<b>M</b>	
A	Output	M	Bit state
AB	Output byte	M	Flag
AW	Output word	MB	Flag byte
		MW	Flag word
<b>B</b>		<b>O</b>	
B	Byte	OB	Organisation block
<b>C</b>		<b>P</b>	
C	2 IBM ASII characters	PB	Program block
<b>D</b>		<b>S</b>	
D	Data block (only as formal parameter type)	SB	Standard function block
DB	Data block	<b>T</b>	
DW	Data word	T	Timer level
<b>E</b>		<b>W</b>	
E	Input	W	Word
EB	Input byte	<b>X</b>	
EW	Input word	X	Bit
<b>F</b>		XW	Address of free address space
F	Fixed point number	<b>Y</b>	
FB	Function block	Y	2 byte constant
<b>H</b>		<b>Z</b>	
H	Hexadecimal number	Z	Counter
<b>K</b>		ZW	Counter word
KB	Constant byte		
KC	Constant 2 IBM ASCII characters		
KF	Constant fixed point number		
KH	Constant hexadecimal number		
KM	Constant bit state		
KY	Constant 2 bytes		

# Appendix

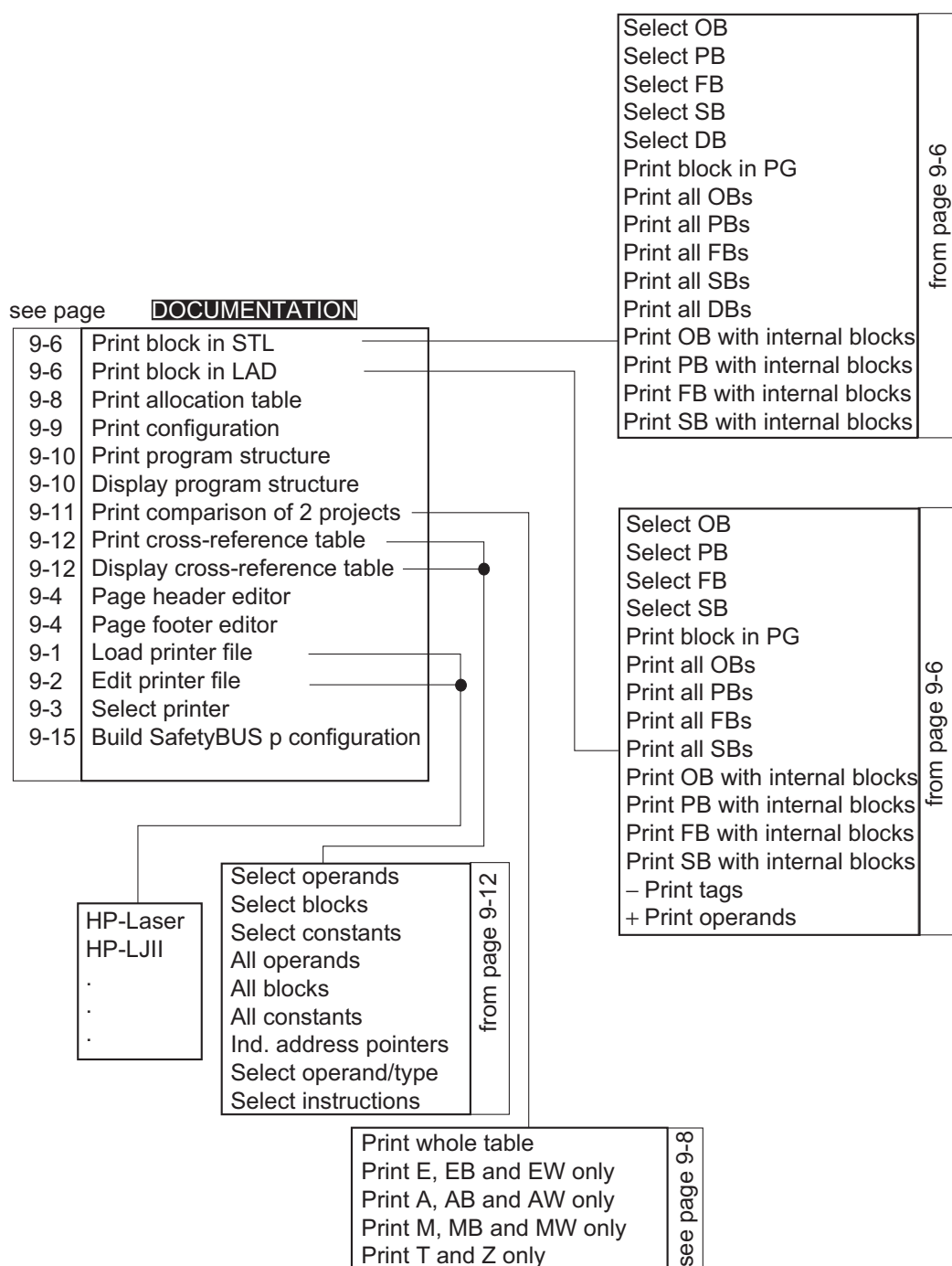
## Menu overview: FS programming

### FS PROJECT Menu





## DOCUMENTATION Menu (FS)



# Appendix

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## OFF-LINE Menu (FS)

see page **OFFLINE**

4-1	Header editor	Select OB Select PB Select FB Select SB Select DB
4-6	Block editor	
4-22	Allocation table editor	
6-2	Rewiring editor	
5-1	Load block	
5-1	Save block	
6-9	Save allocation table	

## ON-LINE Menu (FS)

see page **ONLINE**

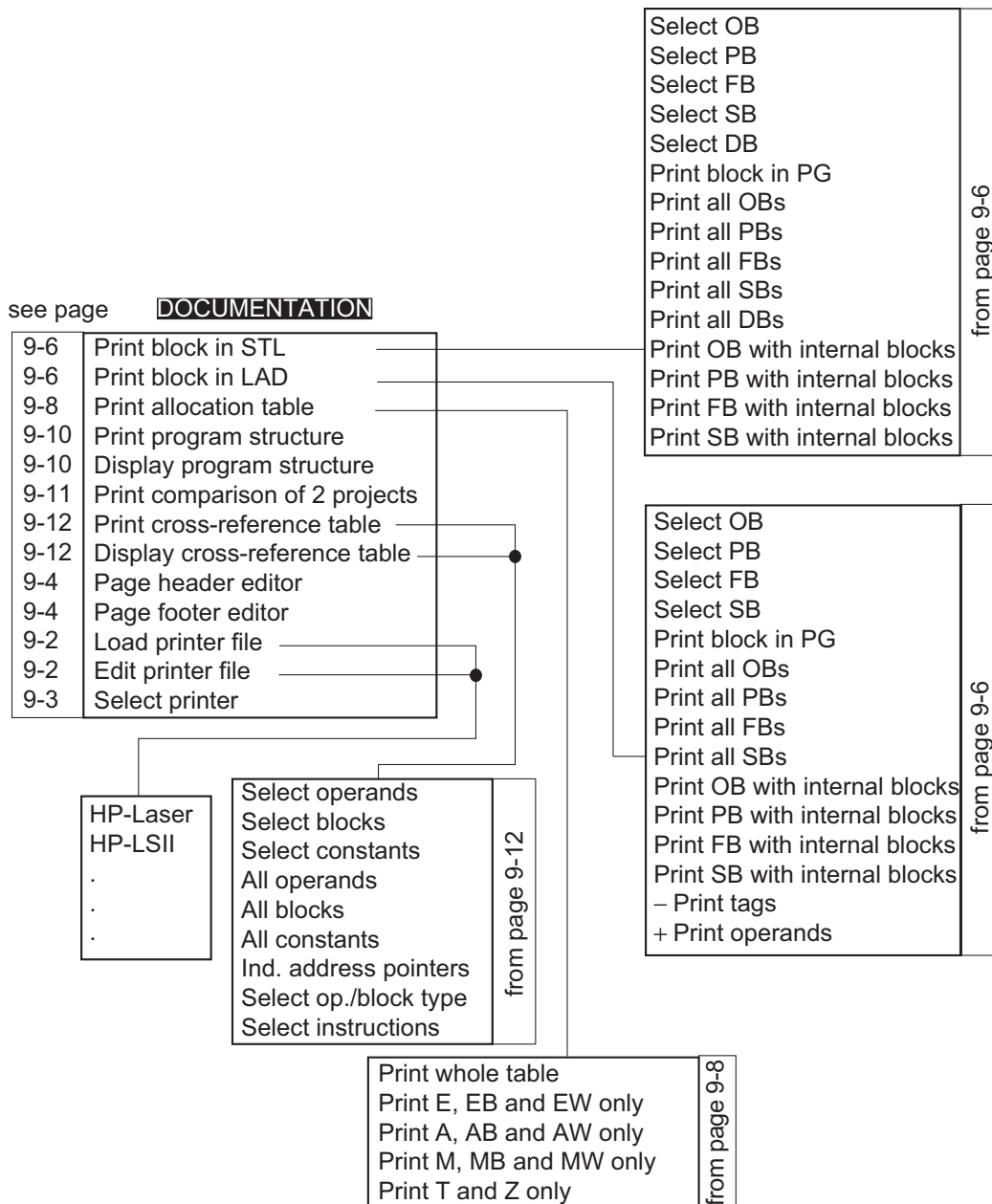
10-2	FS program : Harddisk => PSS
10-2	Delete FS program
10-3	FS program : PSS => harddisk
11-1	Display variables
11-3	Dynamic program display
11-7	Display PSS configuration
10-7	Display PSS directory
11-7	Display PSS hardware
11-7	Display PSS error stack
11-6	Program comparison
11-7	Header editor
11-7	Block editor
11-7	Load block
11-7	Save block
11-7	Link project
10-9	Start PSS
10-9	Stop PSS
11-9	SafetyBUS p

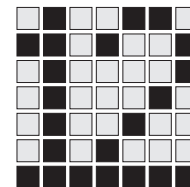




# Appendix

## DOCUMENTATION Menu (ST)





## OFF-LINE Menu (ST)

see page **OFFLINE**

4-1	Header editor	
4-6	Block editor	
4-22	Allocation table editor	
6-2	Rewiring editor	
5-1	Load block	Select OB
5-1	Save block	Select PB
6-9	Save allocation table	Select FB
		Select SB
		Select DB

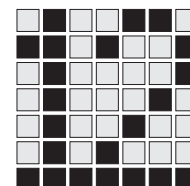
## ON-LINE Menu (ST)

see page **ONLINE**

10-4	Transfer blocks to the PSS	OB => PSS	
10-6	Load back blocks from PSS	PB => PSS	
11-1	Display variables	FB => PSS	
11-3	Dynamic program display	SB => PSS	
11-7	Display PSS configuration	DB => PSS	
10-6	Display PSS directory	PG => PSS	
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		OB => PG	
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		FB => PG	
		SB => PG	
		DB => PG	
		All blocks => harddrive	

from page 10-4

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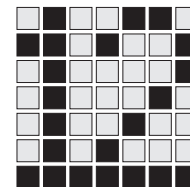


# Appendix

## IBM-ASCII table

0		32		64	␣	96	`	128	Ç	160	á	192	Ł	224	α
1	☐	33	!	65	À	97	a	129	ü	161	í	193	ł	225	β
2	⊠	34	"	66	B	98	b	130	é	162	ó	194	Ť	226	Γ
3	♥	35	#	67	C	99	c	131	â	163	ú	195	†	227	Π
4	♦	36	\$	68	D	100	d	132	ä	164	ñ	196	—	228	Σ
5	♣	37	%	69	E	101	e	133	à	165	ñ	197	†	229	σ
6	♠	38	&	70	F	102	f	134	ã	166	ª	198	‡	230	μ
7	•	39	'	71	G	103	g	135	ç	167	º	199		231	Υ
8	◼	40	(	72	H	104	h	136	ê	168	¿	200	⋈	232	ϙ
9	◊	41	)	73	I	105	i	137	ë	169	ƒ	201		233	Θ
10	◈	42	*	74	J	106	j	138	è	170	¬	202	≡	234	Ω
11	♂	43	+	75	K	107	k	139	ï	171	½	203		235	δ
12	♀	44	,	76	L	108	l	140	î	172	¼	204		236	ϖ
13	♂	45	_	77	M	109	m	141	ì	173	¡	205	=	237	Ϙ
14	♂	46	.	78	N	110	n	142	ÿ	174	«	206		238	€
15	⌘	47	/	79	O	111	o	143	ÿ	175	»	207	≡	239	Π
16	▶	48	0	80	P	112	p	144	É	176	⋈	208	≡	240	≡
17	◀	49	1	81	Q	113	q	145	æ	177	⋈	209		241	±
18	⬆	50	2	82	R	114	r	146	ff	178	⋈	210		242	≥
19	!!	51	3	83	S	115	s	147	ô	179		211	u	243	≤
20	¶	52	4	84	T	116	t	148	ö	180	†	212	Ł	244	ƒ
21	§	53	5	85	U	117	u	149	ò	181	‡	213	ƒ	245	J
22	—	54	6	86	V	118	v	150	û	182		214		246	÷
23	±	55	7	87	W	119	w	151	ù	183		215		247	≈
24	↑	56	8	88	X	120	x	152	ÿ	184	†	216	†	248	•
25	↓	57	9	89	Y	121	y	153	ö	185		217		249	·
26	→	58	:	90	Z	122	z	154	ÿ	186		218	†	250	·
27	←	59	;	91	[	123	{	155	ç	187		219	⬛	251	ƒ
28	└	60	<	92	\	124		156	£	188		220	⬛	252	η
29	↔	61	=	93	]	125	}	157	¥	189		221	⬛	253	z
30	▲	62	>	94	^	126	~	158	℞	190		222	⬛	254	■
31	▼	63	?	95	_	127	△	159	f	191	†	223	⬛	255	

Table 1: Decimal coding of the IBM-ASCII characters



## Troubleshooting the online connection

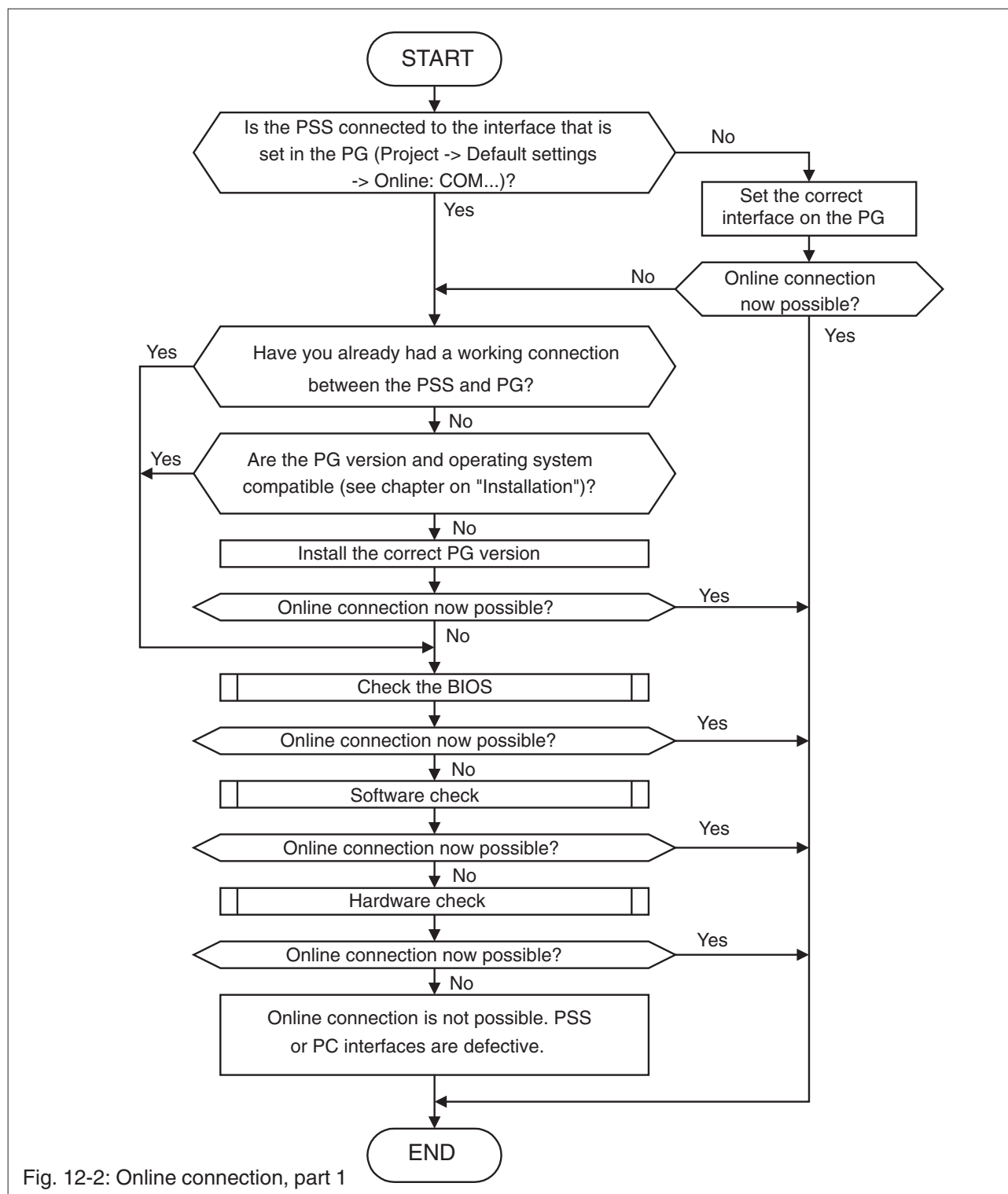


Fig. 12-2: Online connection, part 1

## Appendix

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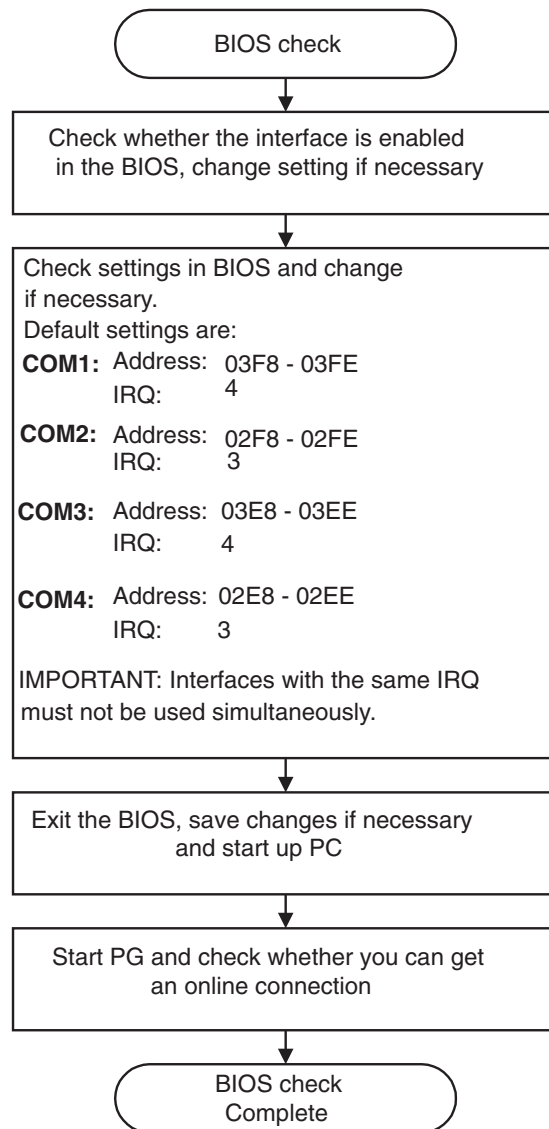


Fig. 12-3: Online connection, part 2

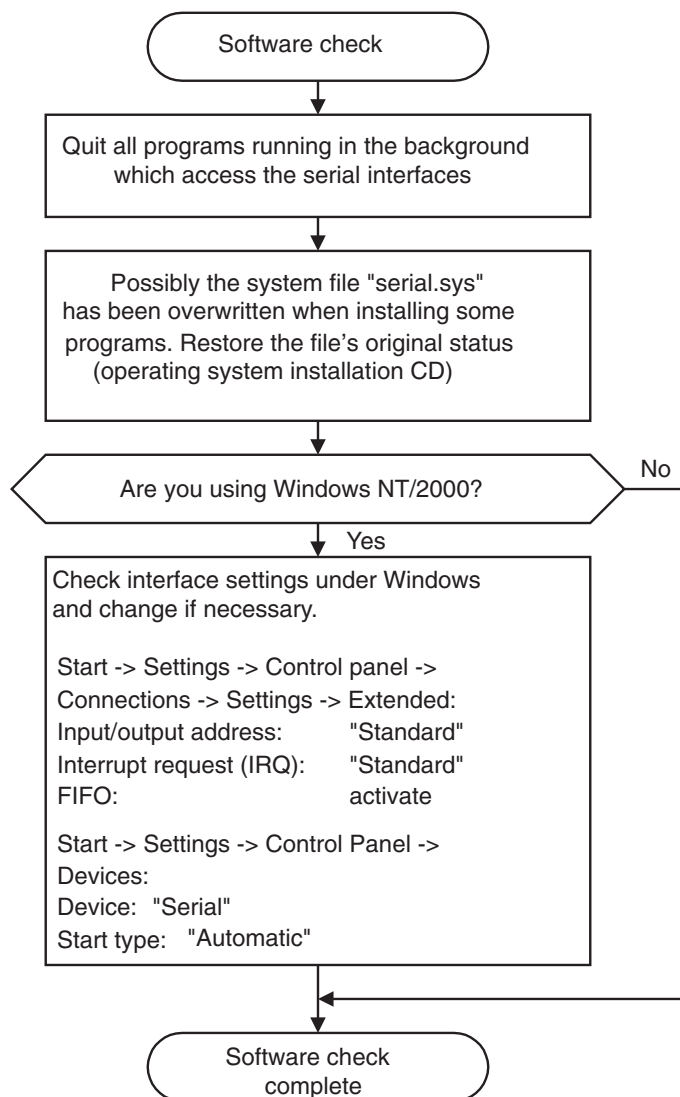
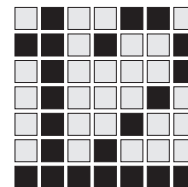
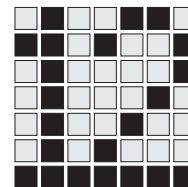
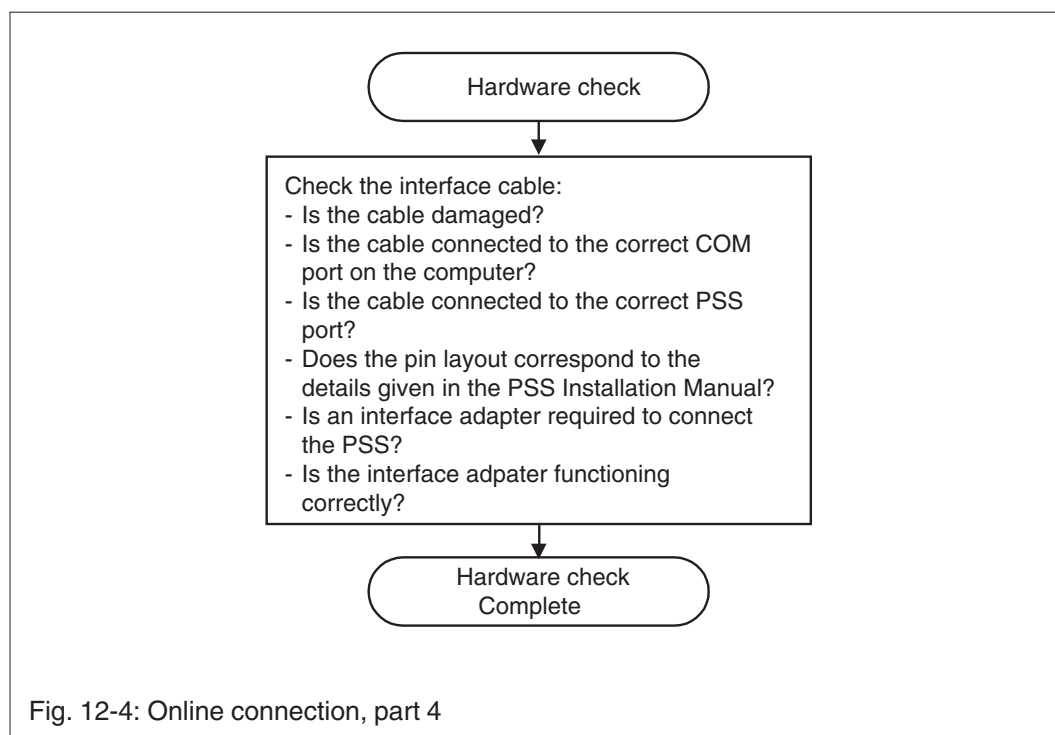


Fig. 12-4: Online connection, part 3

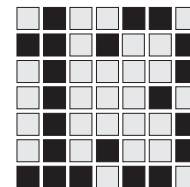


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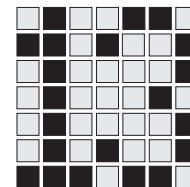
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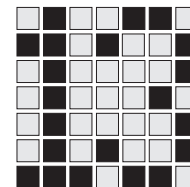
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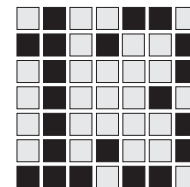
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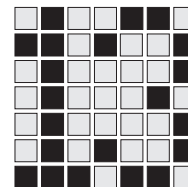
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